

ATTITUDES TOWARD FLOOD MANAGEMENT IN NORTHAMPTON, MASSACHUSETTS A Case Study

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For:
New England Division
U.S. Army Corps of Engineers
Waltham, Massachusetts

November, 1978

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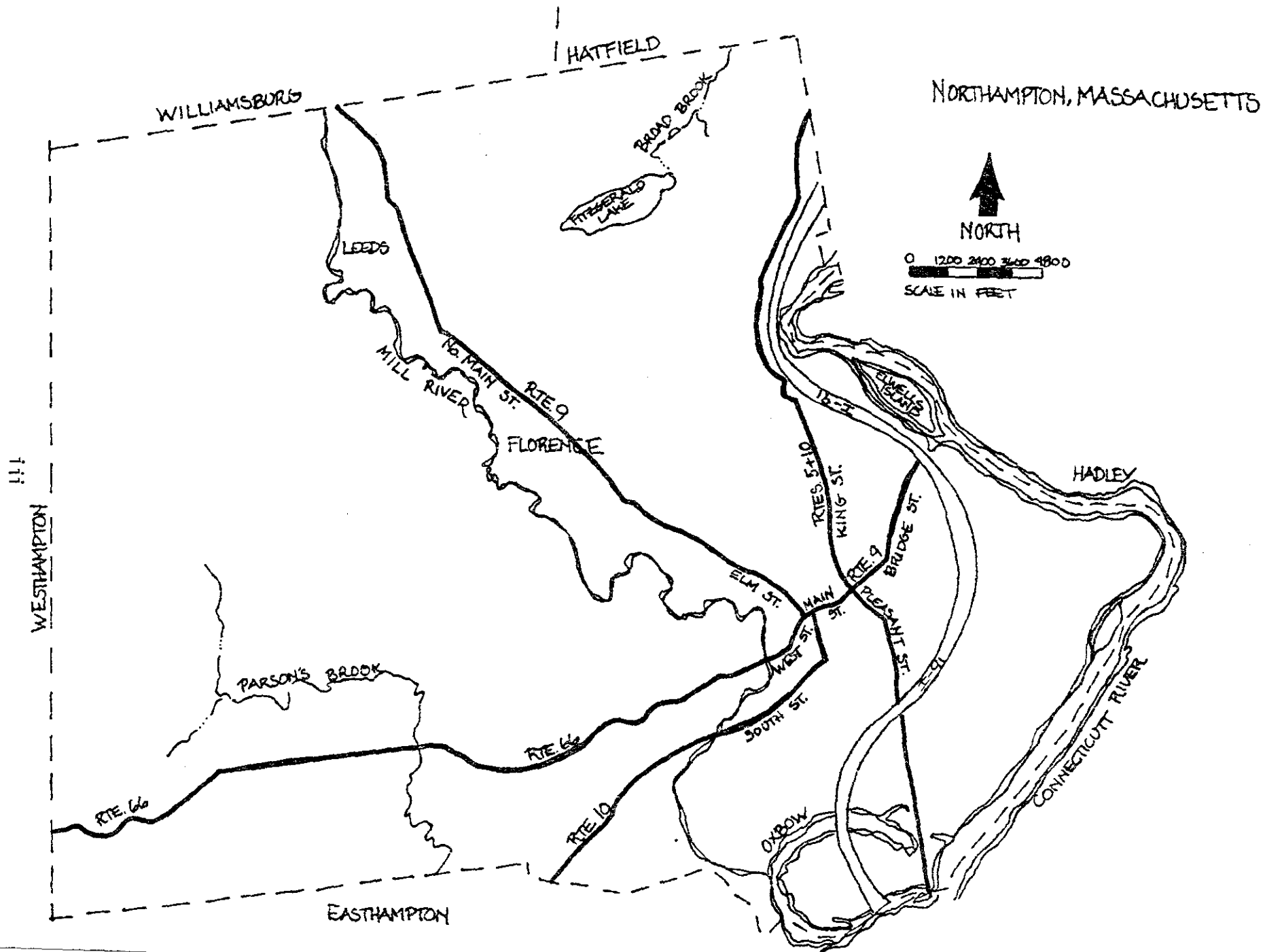
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INTRODUCTION

A. Background and Authority for the Study

The purpose of this study is to examine the attitudes of citizens and government officials toward various means for reducing flood damage in Northampton, Massachusetts. It is part of a much larger, ongoing series of investigations into flooding in the Connecticut River Basin and approaches to reducing flood damage that are simultaneously effective, economically reasonable, environmentally sound, and politically acceptable. A basic premise of the effort is that flood control and mitigation of flood damage can best be realized within the context of a comprehensive management plan for the basin's entire flood plain. It is also recognized that the conception and effective implementation of such a plan depend on the active cooperation of the various states and localities whose well-being is directly affected and whose actions are necessary to the successful application of the plan.

Two documents stand out as being particularly interesting because of the wealth of information they contain and their evaluations of alternative means to reduce flood damage. One is the 1970 Comprehensive Investigation Report of a federal-interstate Coordinating Committee chaired by the United States Army Corps of Engineers. The report covers investigations carried on during the 1960's. The other is The River's Reach, published in 1976 by the New England River Basins Commission after three years of further study. Both reports recognize that, despite existing flood control structures on the Connecticut River and its tributaries, flood damage in the area continues at an unacceptably high level. The monetary cost is estimated to be over \$15,000,000 annually and still rising.* There is, of course, no way to adequately state the human consequences for individuals and for communities.

This particular study is part of a Connecticut River Basin Flood Plain Management Study now in progress. Its draft Plan of Study, prepared by the New England Division of the Corps of Engineers (NEDCE), clearly indicates recognition that good technical information and public acceptance of planned actions are both essential. This study focuses on the latter. It is an examination of the attitudes toward various flood management alternatives of citizens and government officials of Northampton, Massachusetts, and of several state and federal officials whose agency mandates include or are affected by flood plain management activities.

*The River's Reach, p. xii.

Principal authority for comprehensive study of the Connecticut River basin is found in a 1962 Resolution of the United States Senate Committee on Public Works which states:

That the Board of Engineers for Rivers and Harbors, created under Section 3 of the Rivers and Harbors Act, approved 12 June 1920 be, and is hereby, requested to review the reports on the Connecticut River, Massachusetts, New Hampshire, Vermont, and Connecticut, published as House Document 455, 75th Congress, Second Session, and other reports, with a view to determining the advisability of modifying the existing project at the present time, with particular reference to developing a comprehensive plan of improvement for the basin in the interests of flood control, navigation, hydro-electric power development, water supply, and other purposes, coordinated with related land resources.

Further direction is given in Section 73 of the Water Resources Development Act of 1974.

Sec. 73. (a) In the survey, planning, or design by any Federal agency of any project involving flood protection, consideration shall be given to nonstructural alternatives to prevent or reduce flood damages including, but not limited to, floodproofing of structures; flood plain regulation; acquisition of flood plain lands for recreational, fish and wildlife, and other public purposes; and relocation with a view toward formulating the most economically, socially, and environmentally acceptable means of reducing or preventing flood damages.

(b) Where a nonstructural alternative is recommended, non-Federal participation shall be comparable to the value of lands, easements, and rights-of-way which would have been required of non-Federal interests under Section 3 of the Act of June 27, 1936 (Public Law Numbered 738, Seventy-fourth Congress), for structural protection measures, but in no event shall exceed 20 per centum of the project costs.

The present report was prepared for the NEDCE pursuant to Contract DACW33-78-C.

B. Summary of Research Findings

This summary outlines the major research findings, discussed in detail in Chapter III, on attitudes toward flood hazard management in Northampton. (For a synopsis of chapter contents of the entire report, see pages 14 and 15.) Information was obtained through interviews with seven categories of people. The purpose of the interviews was to determine the acceptability and political feasibility of the use of two structural and seven non-structural approaches to mitigating future flood damage.

Structural approaches are major physical projects--dams and such local protection works as dikes. Non-structural approaches are services, programs, and regulations that are required or made available in flood hazard areas through legislation. These include flood plain zoning, flood insurance, flood proofing, public purchase in fee simple, public purchase of limited rights (i.e., conservation easements or development rights), flood warning and evacuation, and disaster relief assistance.

General Conclusions

There appears to be a background of neutrality toward flood hazard management policies among the general population. There is fairly widespread approval of non-structural approaches, with primary opposition expressed by people who expect they might be negatively affected by regulations. There is very little support for building major new flood control structures, in part because they are not seen as politically feasible or fair to people whose land would be taken, and in part for environmental reasons.

Interviews

The seven categories of people interviewed and the major generalizations applicable to each category are discussed below. It should be noted that the substantial diversity of opinions expressed by people within each group is not reflected in this summary.

1. Random Sample of Northampton Residents

A questionnaire was administered to a random sample of Northampton's population, with responses recorded in predetermined

categories.* Participants in the survey were asked to rate each of the nine flood management alternatives both in terms of its effectiveness and in terms of the desirability of using it. There were marked differences of opinion among individuals, but as a whole, the Northampton sample responded favorably toward all of the alternatives. The approaches rated highest for effectiveness were disaster relief and flood warning, followed very closely by a cluster of four alternatives--dikes, flood plain zoning, flood insurance, and dams. Fee simple purchase and partial purchase were rated as less effective; flood proofing ranked last. None of the alternatives was considered to be ineffective by the sample as a whole.

The ratings for approval of the use of the various alternatives were more variable. Disaster relief and flood warning were most strongly approved of. Flood plain zoning was the next most favored approach, with dikes and flood insurance also receiving moderately strong approval. Flood proofing, purchase of partial rights, and dams received mildly favorable ratings. Fee simple purchase was the only alternative viewed negatively; there was mild opposition to it.

In general, the Northampton sample tended to give higher ratings for effectiveness and favorability to the alternatives that are familiar to them--structural/physical and non-structural/legislative approaches that are in place and in use. The relatively low approval of dams appears to apply to possible new structures rather than to existing ones. New dams and the other less favored alternatives--flood proofing, partial purchase, and fee simple purchase--all entail relatively strong government control over the use of private property by individual owners.

A summarizing question asked respondents to select the best among five general approaches to flood hazard management (see pages 96-97). The approaches and the per cent of respondents choosing each are as follows:

- 1) Keep things as they are -- 33%.
- 2) Build more dams and dikes -- 5%.
- 3) Restrict property rights (i.e., zoning, purchase of easements) -- 44%.
- 4) Offer owners financial incentives -- 14%.
- 5) Public purchase of property -- 4%.

*Details concerning the random sample and the questionnaire appear on pages 70-79. The survey data is analyzed on pages 79-113. See especially the attitude data summarized in Figures 8 and 9, pages 90, 92.

2. Flood Plain Residents

A questionnaire almost identical to the one used for the Northampton random sample survey was also used for interviews with residents of the 100-year flood plain area.* Attempts were made to contact all flood plain households; 53 interviews, representing 70% of all households, were conducted. When flood plain residents were asked to rate the effectiveness and desirability of using each of nine flood hazard management alternatives, their responses on the whole were similar in pattern but somewhat more negative than those of the random sample. The alternatives thought to be most effective were, in descending order, flood warning, dams, disaster relief, and dikes. Flood plain zoning and flood insurance were considered somewhat effective, but less so than the first four alternatives. Fee simple purchase, partial purchase, and flood proofing were all rated slightly negatively with respect to effectiveness.

In terms of approval of the use of each alternative, disaster relief and flood warning were most strongly favored. Approval of dikes was moderately strong. Flood insurance and dams were somewhat favored. Flood plain zoning was weakly approved of. Flood proofing and partial purchase were slightly opposed. Moderate opposition to fee simple purchase was expressed; this was the most negatively rated alternative.

In general, flood plain residents tended to rate most highly those alternatives which were familiar and had apparently worked well in the past, and which would provide benefits at little or no immediate cost to themselves. The lower rated alternatives were less familiar to the flood plain residents and would seem to restrict their free use of their property.

Responses to the summarizing question (pages 96-97) are as follows:

- 1) Keep things as they are -- 25%.
- 2) Build more dams and dikes -- 29%.
- 3) Restrict property rights (i.e., zoning, purchase of easements) -- 27%.
- 4) Offer owners financial incentives -- 6%.
- 5) Public purchase of property -- 4%.

Although a substantial number favored more structural works, the majority chose no action or non-structural/legislative approaches of a moderately restrictive nature.

*Details concerning interviews with flood plain residents and the questionnaire appear on pages 68-70, 71-79. Interview data is analyzed on pages 79-114. Attitudes toward flood management alternatives are summarized in Figures 8 and 9, pages 90, 92.

3. State and Federal Officials

Informal interviews were held with state and federal officials whose agencies are involved with and affected by flood plain management policies (see pages 115-118). In each interview, the structural versus non-structural issue was addressed, as were individual alternative approaches to flood hazard management. There was general approval of discouraging flood plain development through flood plain zoning as a basic approach to mitigating future flood damage. Reservations concerning the mixture of zoning, flood proofing, and flood insurance embodied in the federal flood insurance program centered on (1) the possibility that the availability of insurance would encourage rather than discourage flood plain development, (2) failure of the insurance program to be administered so as to prevent rebuilding in severely flood damaged areas, (3) the possibility that local zoning could result in unconstitutional "taking" of flood plain property, and (4) the negative effects that additional regulations may have on future commercial/industrial development. A positive aspect of public acquisition of high flood hazard area property expressed was that, if done carefully in conjunction with the Massachusetts outdoor recreation plan, public access to streams and riparian lands could be increased. The benefit of retaining agricultural lands in their present use through purchase of development rights was noted. Building large new flood protection works was not considered to be a politically viable alternative.

4. Local Officials

Local officials, both elected and appointed, were also interviewed informally. There was general approval of the level of protection provided by existing flood control structures; no support was expressed for additional major structures. Northampton's flood plain zoning received favorable comment, with the major reservation about it centering on the possibility that it might not be enforced strongly enough in the future. It was noted that future growth, new sewer lines in flood plain areas, and different attitudes on the part of future officials could lead to erosion of the effectiveness of zoning regulations. Flood plain zoning was seen as contributing to preservation of the river system's natural functioning and as helping to preserve agricultural land.

Pressure to locate new industries in the flood plain was not expected to be great, largely because other suitable sites are available and because flood risks are known. General satisfaction with the existing flood emergency preparations was expressed. Elected officials (City Council members) reported little or no concern among their constituents about flood management policies except as they related to tangential issues such as increased

traffic and parking problems related to expansion of flood plain recreational facilities.

5. Flood Plain Businesses

Representatives of the seven large businesses located in the flood plain were interviewed (see pages 125-129). They did not anticipate any significant threat of flood damage, in some cases because of long histories of operation at their present locations without experiencing serious difficulties. For the most part, the representatives were not very familiar with flood plain regulations except for a very few instances when negative experiences had occurred. Most did not object to Northampton's flood plain regulations primarily because their plans for the future did not include actions that would result in regulations being applied to them. Some firms had taken such precautions against flooding as placing structures higher than anticipated flood levels or providing pumps. It was commonly felt that government regulation per se was not desirable; businesses should be permitted to assess and take risks as they see fit.

6. Institutional Flood Plain Occupants

The six major institutional landholders in the flood plain are a country club, a city park, a state mental hospital, a private college, a county fair association, and a wildlife sanctuary (see pages 130-134). The representatives interviewed generally expressed no objection to flood plain regulation and had no plans which would result in regulations being applied to them. Some enthusiastically supported the purposes and application of flood plain regulation because of its tendency to preserve the river system.

7. Local Organization Representatives

Representatives of seven local civic organizations reported that in recent years their groups had not held meetings or studied flood plain management issues, nor had any of the groups taken official organization positions on the question (see pages 134-135). The personal opinions of the representatives toward flood hazard management alternatives were mixed, much as among other categories of persons interviewed.

C. Floods and Flood Control Structures in Northampton*

1. Flood History

Floods, whether large or small, are natural events in the life of a river. They are instrumental in shaping the landscape, in maintaining the fertility of flood plain soils, and in replenishing ground-water supplies. Floods become harmful from the human perspective when they damage or destroy communities that people have built in flood prone areas.

Floods in the Connecticut Valley normally occur in the spring or fall in association with heavy rain, melting snow, or both. The earliest recorded major flood of the Connecticut River occurred in March, 1639. A major flood in 1692 maintained a reputation for over a century as the "greatest flood of the Connecticut River." Table 1 lists the five largest floods of the nineteenth and twentieth centuries as recorded in Thompsonville, Connecticut.

Table 1

Five Largest Floods, Connecticut River
at Thompsonville, Connecticut

Date	Peak Discharge (cfs)	Peak Stage (gage ht., ft.)
March 20, 1936	282,000	16.60
September 22-23, 1938	236,000	14.40
May 1, 1854	192,000	--
November 6, 1927	188,000	--
August 19, 1955	174,000	10.93

Source: 1970 Comprehensive Investigation Report, Appendix M.

A few details about these and other floods are interesting because of their particular relevance to Northampton. A flood in 1840 was notable because it was during this flood that a channel was cut across the narrow neck of a large bend in the Connecticut River, forming the present Ox-Bow. The 1854 flood was thought at the time to be the "highest the water could possibly rise." It prompted construction of the first Conz Street dike, which was overtopped and broken through in 1862.

*The principal sources of information for this section were Chapter 41, by Lucy Benson, of The Northampton Book, a tercentenary publication of the City of Northampton (1954); and The River's Reach, pp. 8-15.

There were two large floods in 1869. The one in April broke the Conz Street dike again and flooded the lower part of Main Street. The other, in October, was called the "Pumpkin Flood" because it happened before all the late crops had been harvested and the Connecticut River south of Deerfield was "jammed full of pumpkins."

The Great Flood of 1874 was a man-made disaster. The Williamsburg dam on the Mill River had been built in 1865, a few miles north of the village, by valley industrialists seeking to stimulate manufacturing. People worried about the dam's safety from the beginning, especially when it leaked. It gave way early on a May morning and in almost no time the torrents of water destroyed 15 factories and over 100 homes, killing 145 people. The water spread out over the flood plain meadows of Florence, a natural storage area for flood water, thus sparing the town center of Northampton. (At the time, the Mill River flowed through Northampton center on its way to the Connecticut.)

The November 1927 flood was caused by a long, intense rain storm centered outside the Connecticut basin. It was notable for the suddenness of the water's rise. Three people were killed in Northampton and 101 homes had to be abandoned.

The floods of March 1936 and September 1938 were both associated with intense storms, and both affected the entire basin fairly uniformly. The 1936 flood reached record-breaking levels up and down the Connecticut--records which stand today. It was caused by unusually heavy snow cover melting during a period of warm weather just before heavy rainfall began. In Northampton, this was a terribly long, drawn-out disaster that began on March 13. An ice jam at Mount Tom, where the Connecticut cuts through the Holyoke Range, backed up the already flooding river. In the area, trains were wrecked, roads washed out, and schools and factories had to shut down. Enormous chunks of ice were deposited on the Northampton-Holyoke road. After five days, the jam started breaking up and the water began to go down, but then water from rain to the north came. The Mill River began rising fast--a foot an hour at first. The flood finally crested two days later, on the 20th of March. The Conz Street dike was again overtopped, and at one point on Conz Street the flood water was measured at six feet higher than in 1927. The railroad underpass at Main Street was more than half full of water. Towns in the nearby lowlands were completely evacuated; hundreds of people were rescued by boat. Most people from the flooded areas could not go back to their homes until the 23rd. Not until the 31st was general traffic permitted on Mt. Tom Highway where water had been 13-1/2 feet deep.

Only two and a half years later, in September 1938, the Great New England Hurricane struck, dumping rain when flood conditions were already bad. Along the Connecticut itself, flood stages were somewhat lower than in 1936, but new records were set on many of the tributaries in Massachusetts and southern New Hampshire and Vermont. This time,

the Conz Street dike held, but only because of the diligent labor of Civilian Conservation Corps (CCC) men and townspeople, some 225 workers in all. Winds of 90 miles per hour felled over 1,000 trees in Northampton and raised 8-foot waves on the Connecticut.

2. Flood Control Structures

Clearly, it was time and then some to provide major structural protection against flooding. The Corps of Engineers became involved in January 1927 when it was directed to study and make recommendations for controlling flood hazards along several major rivers of the United States, one being the Connecticut. Congressional approval of a flood control plan for the Connecticut Basin calling for 20 dams and 7 local protection works was included in the Flood Control Act of 1938 (P.L. 75-761). Since then, 16 dams and 7 local protection works consisting of dikes and flood-walls have been built in the basin. Three dams and four protection works were completed by the end of 1941, and three more protection works by 1944. The remaining 13 dams were finished at various times ending in 1970.

Nine dams are upstream of Northampton, thereby protecting the city. Its local protection works--6,500 feet of dike, 500 feet of flood-wall, and a pumping station--were complete in 1941. At the same time, the lower Mill River was diverted from its natural passage through the city to a more westerly channel, bypassing the most heavily built up area and emptying into the Ox-Bow. The Corps of Engineers estimates that the combined effect of these structures is to reduce the likelihood of flooding in the diked areas of the city from a flood comparable to 1936 to about one-half of one per cent in any given year. Or, to state the risk another way, it would require a flood likely to occur only once in 200 years to overtop the dikes.

Other floods have occurred since these protection works were installed, but in Northampton none has approached the magnitude of the 1936 and 1938 disasters. Most notable was the 1955 flood associated with Hurricane Diane, centered just north of Hartford. It affected only the lower third of the Connecticut watershed causing very high (third ranking) flood stages in Hartford but proportionately lesser ones upstream.

D. The "Non-Structural" Issue

Dams, levees and dikes along with channel straightening, diversion and deepening have been common means for people to regulate the flows of rivers to achieve various social and economic purposes. Water supply, hydropower and navigation were historically the values sought. The use of these engineered works particularly as means to partially prevent flood flows from occupying natural flood plains is a practice that has grown over the past two centuries.

Reliance on structures for flood risk reduction is an issue surrounded by controversy. Without regard to other values gained or lost,

just the hydrologic principles of how best to reduce flood probabilities at any flooding level have been argued for many decades. There are those who adhere to the belief that flood potentials should be reduced by managing the capacity of the land through agricultural and forestry practices to absorb and retard the discharge of water from storms and snow melt. If structures have to be built, they should be placed on small headwater streams. In short, manage water where it falls on the land.

Against this argument is the knowledge that floods at various levels occur even in pristine environments. Thus, if there is to be a reduction in the probable frequency or extent of flood damage, it is necessary to structurally regulate high flows by impounding flows on main stem channels or major tributaries. Further, it may be necessary to engineer artificial channels by building dikes and levees or changing the shape of natural channels.

The controversy over whether flood management policy should emphasize upstream or downstream works is today almost moot. The nation, and the Connecticut Basin is no exception, has elected to use combinations of both approaches.

Sitting counter to the classic upstream-downstream issue is the view that the only reason we need to control floods is because there are human lives and capital investments on the natural flood plain that can be damaged by floods. Remove or reduce the number of human occupants and their capital works and there will be no real need to control floods or to require society to recompense or reinstate those who suffer flood damage.

Regardless of the logic of any of the arguments over flood and flood damage regulation, application of that logic has been substantially pre-empted by the character of human use of flood plains and rivers over hundreds of years.

In the Connecticut River Valley we now experience the results of earlier choices about flood problems. The flood plains are occupied by cities and farms, and dams and dikes are built. The number of people and the amount of investment are increasing in flood hazard areas; risks to life and economic well-being are enlarged thereby. Yet, in the periods between floods, efficiencies in private and public enterprise are gained--lowered development costs; location advantage relative to existing and supporting economies and public works; and enjoyment of waterside recreation and aesthetic views. Complicating this picture is the understanding born of a more accurate knowledge of hydrology and ecology that the values enjoyed through flood plain occupancy may be deceptive and not economically real when measured against the costs of higher future damages from inevitable floods; the present impairment of ground water recharge; removal of high quality agricultural areas from production; loss of natural flood regulation through wetlands destruction; and the reduction of physical and visual access for the public to riparian lands.

Response to the growing dilemma has occurred at all levels of government. Federal actions such as the Water Resources Planning Act of 1965 and the Water Resources Development Act of 1974 authorize planning activities that should consider non-structural means for reducing flood damage. The National Flood Insurance Act of 1968 provided for flood insurance subsidies and encouraged better land use on the flood plain through a unified national program for flood plain management. The Flood Disaster Protection Act of 1973 offered opportunity for occupants of flood plains to buy increased amounts of subsidized insurance, and provided further requirements of insurance holders for improved building features to physically reduce risks from flood damage. Furthermore, the insurance is only available in places where the local government has adopted land use regulations limiting flood plain development. Depending on one's view, these acts encourage use of the flood plain or they offer an alternative to demands for more dams and dikes by allowing those who suffer damage to recoup some of their capital losses through insurance. Federal programs to provide help in pre-flood evacuation of people and property, and to offer financial relief for flood-stricken areas are other efforts to reduce the costs of flood damage to individuals and public agencies.

At the state level, Massachusetts has adopted policies that discourage flood plain use. Laws protecting inland wetlands and laws to encourage continuing agricultural use of land are often most strenuously applied in flood plain areas.

Northampton has followed this trend by enacting a zoning ordinance in 1975 that created a "special conservancy" district in the flood plain.

Despite these and other public actions to discourage flood plain occupancy and alteration of flood plain hydrologic functions, there seems to be no convincing consensus in the Connecticut Valley that the area should rely on non-structural approaches to flood damage control. The issue of the abridgment of private property rights through restrictive zoning or use of eminent domain powers underlies arguments in all cases. This problem is unlikely to be treated simply or immediately anywhere in the Valley or the nation. Persons already on the flood plain express concerns for the well-being of themselves and their property and often want the assumed security of flood protection structures.

The pure arguments for vacating the flood plain remain, but they do not strike the balance between present social-economic needs and flood damage control issues. Non-structural approaches seem destined to become increasingly a part of the flood management repertoire, but the larger questions of how soon, how much, where, and who will support those approaches at what direct and opportunity costs are not as yet answerable.

E. Purpose and Methods of the Study

The basic goal of this study was to find out what the attitudes are of a broad spectrum of people who are involved in various ways in deciding what should be done with respect to floods and flood management in Northampton, Massachusetts. It was assumed that their attitudes have an important bearing on what government does or does not do about floods and on the effectiveness with which programs are carried out. The kinds of information sought are suggested by these questions: Do people think there is a significant flood hazard in Northampton? What, if anything, should government do about it? Is it better to rely on structures such as dams and dikes or are there other effective ways to help prevent the personal, social and economic distress that accompanies floods? What will work, and what is equitable? The answers to such questions should provide useful guidance to responsible government officials with respect to both the political feasibility of implementing alternative flood management strategies and the possible need for fostering greater understanding of the facts and issues involved.

A broad range of publics was interviewed--the general citizenry, flood plain occupants directly affected by management and regulatory activities, government officials responsible for devising and administering flood management programs, and representatives of selected local organizations. In a very general sense, these populations, or categories of people, were expected to differ one from another with respect to their knowledge of the subject, their interest in it, and/or their attitudes toward specific flood management alternatives. It was also expected that a diversity of opinion would be found within each population.

A random sample of Northampton residents was interviewed in order to obtain a representation of the thinking of the general public. As many as possible of all flood plain occupants--residents, business people and other institutional landholders--were interviewed, since these are the people most directly affected by floods and by government programs concerned with the flood plain. Representatives of some local organizations with a general interest in public affairs were contacted in order to find out whether or not the organizations had undertaken studies or adopted positions on flood-related issues. The personal opinions of these individuals, as distinct from their organizational roles, were also sought because their active participation in such groups was assumed to indicate a relatively high level of interest in public affairs. Interviews with local government people included both elected and appointed officials. It is at this level where knowledge of particular local circumstances is most intimate, where the detailed application of many flood programs takes place, and where public response is perhaps most acutely felt. State and federal officials of agencies concerned with flooding and flood plain use were interviewed

to obtain their perspectives on policy choices and administrative functions.

Interviews with flood plain residents and the random sample of Northampton residents were structured, in that a questionnaire was used and answers to each question were recorded in predetermined categories suitable for computer use. All other interviews were less structured. Specific kinds of information were sought, but not necessarily through an established sequence of questions. No attempt was made to fit responses into predetermined categories.

It should be noted that the information presented here, as for any study of attitudes, does not describe community behavior. Rather, it describes what people perceive to be true, within the limits of their ability and willingness to express their perceptions. The importance of this distinction and the consequences that result from it obviously depend on the degree to which people make decisions and act according to their expressed attitudes. Furthermore, all of the opinions gathered, assembled, and interpreted in this study were necessarily filtered through the complex sets of perceptive capacities and biases of the individuals who did the work.

F. Chapter Contents

Chapter I contains a brief description of the study area, the City of Northampton, that is meant to serve as a framework for understanding the issues and attitudes discussed in more detail in later chapters. First, the city is placed within its regional context. Then the development of the city and some general characteristics of its people are outlined. Land use patterns and trends, especially during the latter part of this century, are described. Special attention is given to land uses within the flood plain. An analysis of the city's economy is presented which includes comparisons with larger geographic areas and prognoses for various segments of Northampton's economy. The chapter concludes with brief summaries of laws and regulations which are especially pertinent to the management of floods and flood plain uses in the study area.

Chapter II describes the collection and statistical analysis of survey data obtained from the census of flood plain households and small businesses and the random sample of the city's population. The kinds of questions used in the questionnaire and reasons for asking them are given. The methods used for identifying the two groups to be surveyed are stated, and an accounting is given of the numbers of survey interviews completed, persons who refused to be interviewed, and households that were not contacted. In the final section, data for each

of the two groups are presented and analyzed, and comparisons between groups drawn.

The remainder of the interviews are described in anecdotal format in Chapter III. For each category of persons, the substance of the interviews is summarized and generalizations are drawn about the thinking of people in each category as a whole. In order of presentation, the groups are government officials (further subdivided into federal/state and local office holders), flood plain businesses, institutional flood plain occupants, and local organization representatives.

Chapter IV summarizes and evaluates the research findings. Implications of the findings are suggested, and finally comments on the effectiveness of the study itself are offered.

The Appendixes contain supplementary information which may be of interest to some readers but was thought unnecessary to be included in the body of the report.

I. NORTHAMPTON

A. Regional Setting

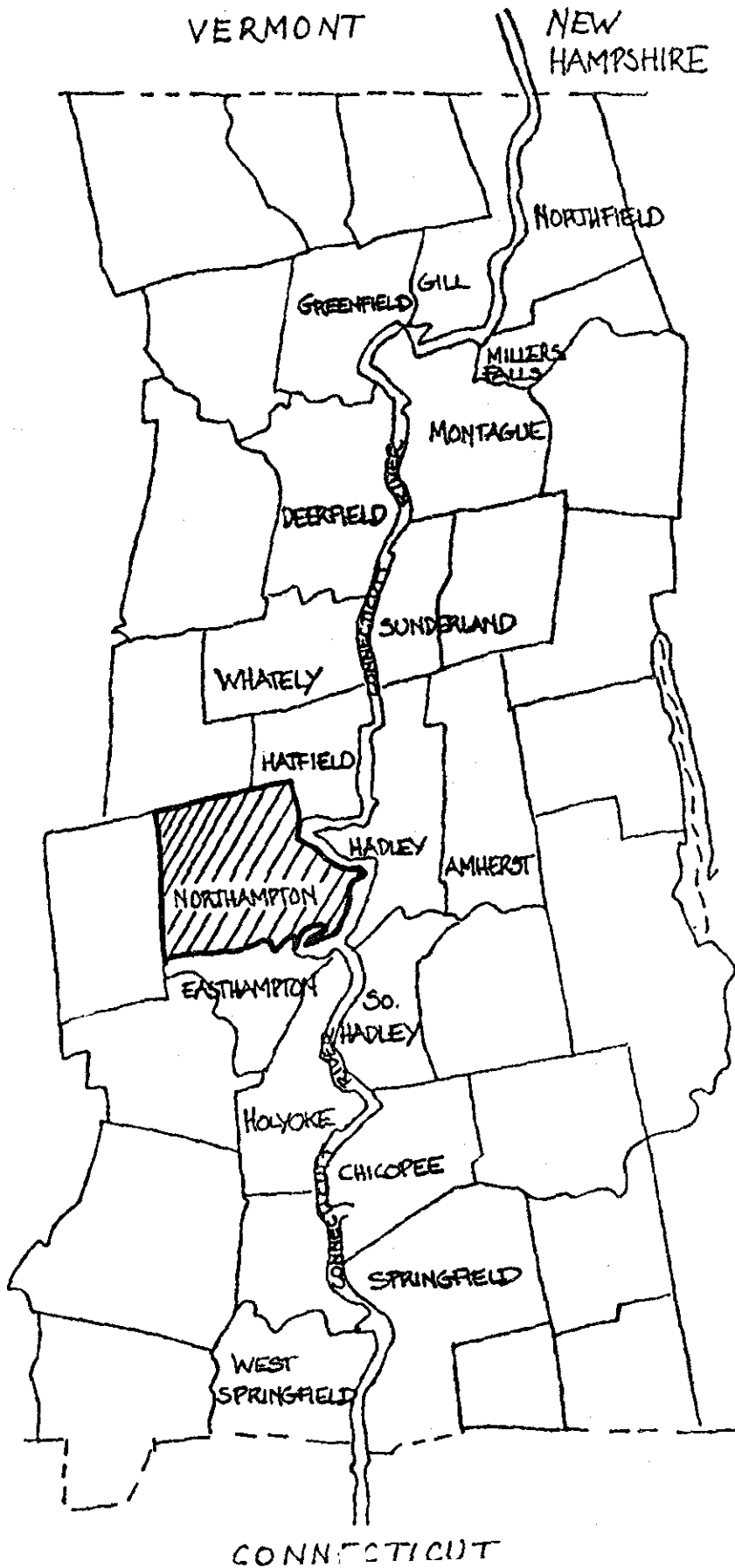
1. Physical Setting

Northampton lies about midway in the Massachusetts section of the Connecticut River Valley. Like the west bank towns to the north of the city, it shares the characteristic of encompassing the flood plain of the Connecticut River along its western boundary and the foothills of the Berkshire mountains in its eastern portion. Historically, it was this combination of river flats and steep hills that produced the development of agriculture and industry. Farms were built upon the alluvial soils of the valley that are composed of the reworked glacial materials that overlies the lake bottom deposits of pre-Pleistocene Lake Hitchcock. Streams tumbling from the Berkshires provided sites for water-powered industry which historically developed at much the same time as agriculture. Northampton shares these characteristics with the mid-valley towns of Hatfield, Whately and Deerfield more so than towns farther to the north. There the flood plains of the Connecticut River are narrowed considerably by the intervention of the hills of the Pocumtuck range. Still farther north where the river flows through the towns of Northfield, Gill and Greenfield, it is entrenched between bluffs which are sufficiently high to contain its flood flows.

South of Northampton the Connecticut River Valley is intersected by the Holyoke Range on the eastern side of the river and Mt. Tom on the western side. This low range of steep hills, oriented roughly east to west across the valley floor, has provided a significant barrier that has effectively impeded the coalescing of development taking place in Northampton with that of the Springfield metropolitan area south of the hills. South of the Holyoke range the flood plain area is mostly on the eastern side of the Connecticut River. There, agriculture in the towns of South Hadley, Holyoke and Chicopee was historically and to a certain extent still is important in the land use and economics of the region.

This physical setting has greatly influenced the character of land use and development throughout the region. North-south transportation routes became the dominant means of transport and communication. The Berkshire mountains to the west were a land barrier to westward travel. Rail transportation from Northampton on an east-west orientation had to move to the valleys of the Chicopee and Westfield Rivers south of Northampton connecting Pittsfield, Springfield and Boston, or to the Deerfield and Millers Rivers north of Northampton connecting Albany, N.Y., and Boston. This is as true today as it was historically. The

FIG. 1 CONNECTICUT RIVER VALLEY COMMUNITIES IN MASSACHUSETTS.



major east-west highway routes also lie north (Route 2) and south (the Massachusetts Turnpike) of Northampton. The hill complex of Mt. Tom and the Holyoke Range is still effective in preventing a joining of development in the Springfield portion of the valley with that to the north of the hills.

2. Social-Economic Setting

Over the years Northampton has developed into a commercial and governmental center for the mid-valley region. The city is the seat of Hampshire county government and has the only substantial industrial base within the mid-valley. Not until traveling to Greenfield and Turners Falls does one encounter another analogous center serving Franklin County in the northern portion of the Connecticut River Valley region.

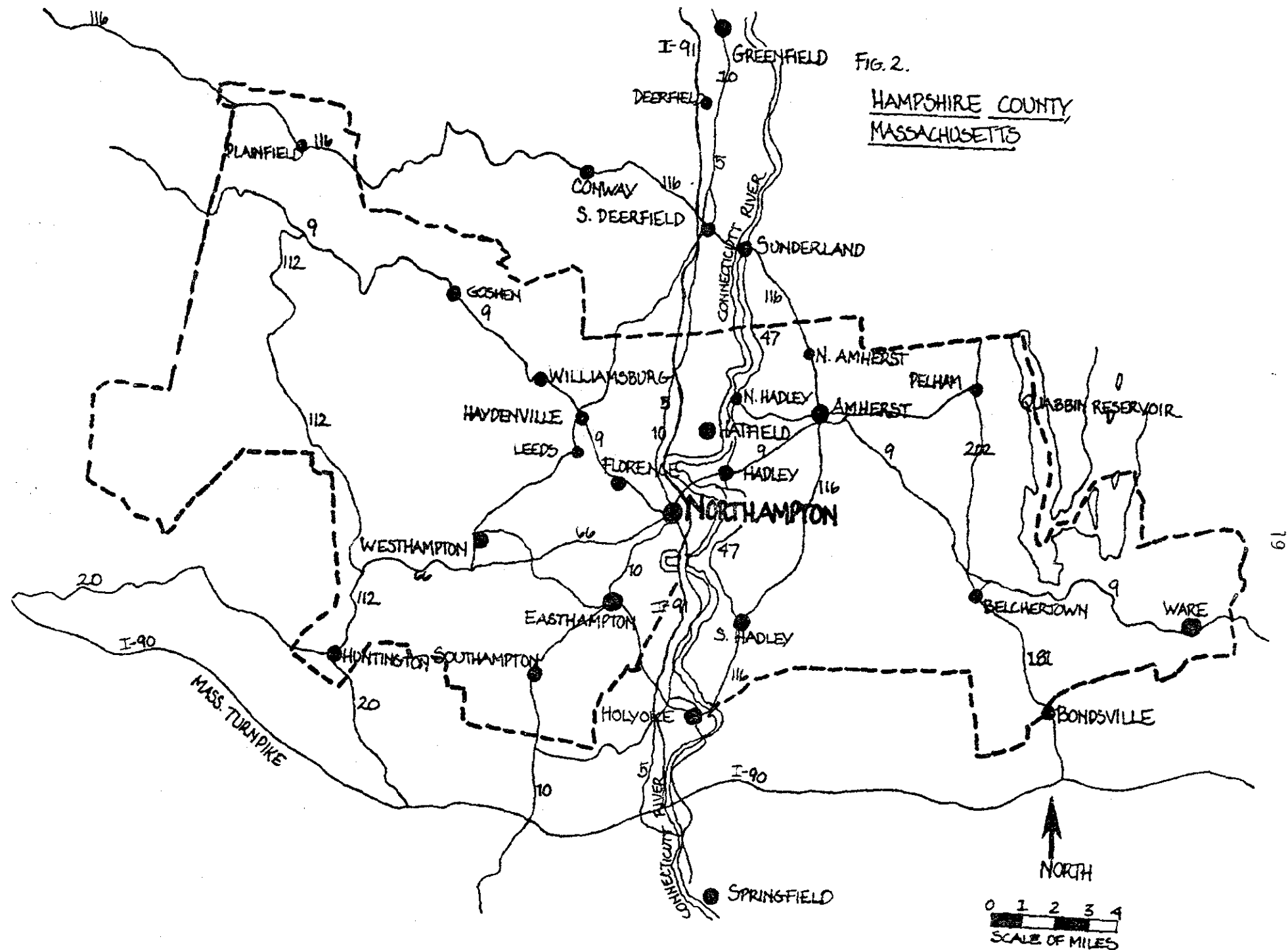
Over the past several decades Northampton's links with the town of Amherst have grown as transportation and commercial strips have developed east from Northampton through Hadley to Amherst. Also there is a strong affinity between Amherst, South Hadley and Northampton because of the presence of Smith, Amherst, Hampshire and Mt. Holyoke Colleges and the University of Massachusetts at Amherst. These institutions play a key role in the economy and society of the communities.

Northampton continues to have a place as an agricultural producer along with the enclave of towns on both sides of the river which share the broadest section of the Connecticut River flood plain. Throughout this mid-valley region, communities have thus become linked through common agricultural enterprise, common cultural and educational emphases, and, to an increasing extent, a common population which commutes freely within the central valley to the colleges and university and to a lesser extent to commerce and industry. Waves of immigrants from Europe and Canada have contributed to the richness and variety of experience for the several towns. As an outgrowth of this mixture of social elements, the attitudes and life patterns of the residents often exhibit the differences between the life style of those who reflect the intellectual and open experiences of the education community and those who are influenced by the rural and ethnic traditions, particularly as they are reflected in recent immigrants and their first-generation offspring.

The social heterogeneity of the central valley thus produces sometimes a sharp political distinction between towns and sub-sections of towns concerning critical matters such as land use and social welfare programs. Yet, despite these often strong points of contention, there is a general consciousness of regional identity. With the geographic intermixing of populations from all backgrounds as it has occurred in the past two decades, there is a growing common awareness of the special

FIG. 2.

HAMPSHIRE COUNTY
MASSACHUSETTS



qualities of life in the valley and a beginning of a sense of purpose toward preserving the character and diversity of the physical and social environments.

B. Development and General Characteristics*

1. The River's Influence

Settlement of Northampton began in 1654 in the area of what are now Pleasant, King, Market, Bridge and Hawley Streets. Permanent settlement of Florence and Leeds, Northampton's two other town centers, began after the Revolutionary War. The significance of the Connecticut River and its tributary Mill River for the successful establishment and development of these communities was great indeed. Northampton began, as was common for pioneering centers, with its livelihood heavily dependent on subsistence agriculture. Very soon the export to coastal areas of agricultural products--principally wheat at first--began to supply income needed to buy products not locally available and for the accumulation of investment capital. All of this was based on the rich soils of the Connecticut Valley, product of the river's work on the land surface.

Fish from the rivers was an important part of the diet of the settlers and was also exported, as far away as the West Indies and Europe.

Power derived from the flow of Mill River was a necessary element in the development of Leeds and Florence into manufacturing centers. The Connecticut River was the major route for transporting goods to and from Northampton until railroads largely took over this role in the latter half of the nineteenth century.

2. Agriculture

Agriculture flourished on the flats of the Connecticut Valley in Massachusetts and Connecticut. The quality of the soil, the level terrain, and the moderate valley climate make the area eminently suitable for farming. Diversification of crops allowing for local self-sufficiency was the rule at the beginning. Specialization and cash crops developed later. In Northampton and other parts of Hampshire

*The major source for historical information in this section was The Northampton Book.

County, sheep were raised to produce wool for the mills in Leeds and Florence. Vegetables and fruit became important, along with tobacco. These crops were sold regionally and beyond. In the early part of this century, "Hadley asparagus" was offered on the menus of fine restaurants in New York and Europe. Local tobacco became a highly specialized crop with the introduction in 1901 of cheesecloth netting over the plants, resulting in shade-grown tobacco used to wrap cigars.

In Northampton itself, the importance of agriculture relative to the total economy declined sharply during the 19th century, partly because of the increasing emphasis on industry, education, and other services.

The Three County Fair

Agricultural fairs developed as an ancillary activity. They provided not only a showcase for the display of farm-related products, they were also entertainment and social occasions of the first rank. The Hampshire, Franklin and Hampden Agricultural Society sponsored its first fair in 1819 at Main Street in Northampton. Over the next forty years or so, the fair was held a few times in West Springfield (Hampden County) or Greenfield (Franklin County), but it was essentially a Northampton event. It is the oldest continuous fair in the United States.

When the fair outgrew its Main Street location it was moved for a time to North Street, a somewhat unsatisfactory place because it was not central enough. For a few years the events and displays were divided between the two locations, but this was not a popular solution. Finally, just before the turn of the century, a race track and grandstand at Fair Street were bought by the Fair Association. Considerably expanded and improved, this is the site of the present Three County Fairgrounds.

A wide variety of entertaining events has been offered, including plowing contests, balloon ascensions, horse-auto races, and once even a wedding. However, horse races have been a mainstay from the beginning. Pari-mutuel betting was first permitted on the fair's horse races in 1943. This has proved to be very beneficial to the fair financially, providing a much-needed source of funds that has, among other things, allowed for improvements and additions to the facilities used for agriculturally-oriented activities.

3. Industry

Leeds and Florence started out with economies based on agriculture and home industries. An early trend toward industry was apparent by 1800. Soon a lumber mill opened in Leeds, then a woolen mill, then a

cotton mill. Beginning about 1820, the number of mills in Leeds and Florence increased more rapidly and the variety of products proliferated. By 1855 there were 74 water-powered mills which employed 10% of all labor in the Massachusetts section of the Connecticut Valley and produced 10% of all value in that area. The market area for some of the goods was at least nationwide. Products included wool, cotton, and silk fabrics; buttons; furniture; caskets; paper; ink; sewing machines; farm tools; baskets; cutlery; brushes of all kinds; oil and gas cooking and heating stoves; wagons; clocks; and cardboard containers, primarily for use by the fabric manufacturers. Several mechanical and other innovations were introduced in Northampton, permitting some "firsts" in American manufacturing--first broadcloth, first silk twist thread acceptable for use with sewing machines, and first mechanically produced cloth-covered buttons.

Water was virtually the only source of power used until the introduction of steam power in 1857. Conversion was fairly rapid and was accentuated by the 1874 flood of the Mill River.

Concurrent with Northampton's heyday as a manufacturing center was the existence of an active railroad system which provided the city with a regional transportation network and with east-west lines capable of handling freight traffic. Also, the change from privately held businesses to corporate structures experienced throughout the nation permitted a new ease and flexibility of capital formation. However, the latter proved to be a mixed blessing for the city. In some instances the availability of outside capital and the spread of financial risk brought about by corporate mergers has helped maintain businesses in Northampton. Despite name changes and alterations of product lines to suit contemporary markets, a few are located still at the original mill sites. One example is the Pro-Brush Division of Vistron Corporation. A manufacturer of plastic products and of brushes, it is a direct descendant of the Florence Manufacturing Company, founded in 1866 and maker of a variety of products including their famous hair-brushes of superior quality and reputed to be "completely waterproof." In other cases, local plants became in effect branch facilities of larger entities and were readily expendable during periods of adverse economic conditions. The silk industry is a case in point. It had been the dominant industry in Northampton from after the Civil War through World War I. Following the latter war, the silk industry as a whole underwent a period of substantial retrenchment. The Northampton "branches," whose corporate base was in Connecticut, were closed.

4. Other Institutions

Education has become one of the more important elements of the life of Northampton. The town's first school was opened in 1664 when there were about sixty families. Other public schools were soon added in various parts of the town, and shortly after 1800 even girls were

provided with public schooling. Over the years, a number of innovative or specialized schools were founded, most of them closing after a time. One that lasted is Clarke School for the Deaf, chartered in 1867. Here, the emphasis was on oral speech and lip reading, rather than communication by hand signs. It was also here that Alexander Graham Bell made his contributions to education of children with impaired hearing. He was particularly instrumental in developing training for their teachers. In addition to teaching children and their teachers, Clarke School also conducts related research.

Smith College was chartered in 1871 and received its first students in 1875. It was the first full-fledged women's college in New England. Initial funding and inspiration came from Sophia Smith, a resident of Hatfield. In her view, quality education for women would contribute to their eventual equality with men in terms of wages, intellectual achievement, and influence. In addition to the personal enrichment of the students, society as a whole would benefit. The college grew in size, breadth of curriculum, prestige and endowment so that it has for many years been a highly respected institution. Its downtown location is symbolic of the college's longstanding tradition of participation in public affairs by administrators, faculty, and students.

Northampton has three medical institutions of regional significance. Northampton State Hospital opened in 1858 in response to pressing need for a mental hospital in western Massachusetts. It was intended to be one of the more advanced institutions for its time, including outdoor exercise, attempts at occupational therapy, and weekly religious services. The physical plant has grown considerably and approaches to treatment have changed over the years. The relatively recent de-emphasis on treatment in large institutional settings has effectively curtailed the hospital's growth, although it remains a needed facility and, incidentally, a place of employment for many Northampton residents.

The two other medical institutions are Cooley Dickinson Hospital, offering general patient care and other services to the area, and the Veterans Administration Hospital in Leeds.

5. Government

Northampton was originally governed by a Town Meeting to which were delegated all local governing powers authorized by colonial law. It soon became apparent that a more orderly procedure at Town Meetings was needed, so a Moderator and Townsmen (later Selectmen) were chosen to act as chairman and present subjects for discussion to the meeting. In addition, a number of public offices were established, forming the beginnings of a Town Administration.

In 1883 a change was made in governmental structure that went into effect the following year. Northampton was incorporated as a city governed by an elected mayor, board of aldermen and common council. One alderman and three councilmen were chosen from each of the seven wards. Other elected officials included the city's clerk, treasurer, school committee, and library trustees. Various other officials and boards were appointed by the mayor and council--police and fire chiefs, tax collector, water commissioner, superintendent of streets, boards of public works and health, and others.

The city charter was revised, after much agitation for reform, in 1955. The Board of Aldermen was eliminated, having become somewhat of an anachronism. Northampton was at the time one of only a handful of cities in the country retaining a two-chamber council. The present city council has nine members, one from each ward and two elected at large. Also, some changes in the administrative structure were made. Nearly all of the departments are now headed by a board or commission (i.e., city planning, public works, recreation, conservation) or chief administrator (police and fire departments) appointed by the mayor and city council. The school committee is still elected separately, as in all Massachusetts cities and towns.

The city council is final determinor of departmental expenditures, except that it cannot reduce the amount set by the school committee for education.

County Seat

From 1662 to 1812, the Hampshire County courts and shire meetings met one year in Northampton and the next in Springfield. Hampden County was organized in 1812, with Springfield designated seat of the county government. In the same year, Northampton became the permanent Hampshire County seat. Its courts and other county offices are housed almost entirely in Northampton's central business district, with most of them located in the court house.

6. Population

From first settlement until about 1830, the number of people in Northampton increased at a more or less steady rate. During that entire period, the enumerated population consisted almost exclusively of Yankee stock. Tables 2 and 3 show that there was a period of very rapid population increase between the 1840's and about 1900.* The

*The data in the two tables are not entirely comparable for this period because the years of enumeration are different and because the

Table 2

Population of Northampton, 1800-1905, with
Number and Percent Foreign Born

Year	Population	Foreign Born	
		N	%
1800	2,190	*	*
1810	2,631	*	*
1820	2,854	13	.5
1830	3,613	43	1.2
1855	5,801	1,376	23.7
1875	11,108	2,817	25.4
1885	12,896	3,354	26.0
1895	16,746	4,180	25.0
1905	19,957	4,942	24.8

*Not available.

Source: Derived from The Northampton Book, pp. 332-336. Figures for 1800-1830 are from the U.S. Census. Figures for 1855-1905 are from the Massachusetts Decennial census. 1865 was omitted because of transitory shifts attributable to the Civil War.

Table 3

Population and Percent Change
for Northampton, 1840-1970

Year	Population	Percent Change
1840	3,750	--
1850	5,278	+40.7
1860	6,788	+28.6
1870	10,160	+49.7
1880	12,172	+19.8
1890	14,990	+23.2
1900	18,643	+24.4
1910	19,431	+ 4.2
1920	21,956	+13.0
1930	24,381	+11.0
1940	24,794	+ 1.7
1950	29,063	+17.2
1960	30,058	+ 3.4
1970	29,664	- 1.3

Source: U.S. Census.

proportion of foreign born persons rose to almost 24% of the city's population by 1855, a level that was maintained beyond the end of the century. These were immigrants from Europe and Canada. The single most numerous group consistently came from Ireland: 913 persons born in Ireland were counted in 1855, 1,745 in 1885, and 1,623 in 1905.* The ratio of females to males was about 3 to 2, probably caused in part by the Irish dowry system which made it nearly impossible for many poor Irish women to ever marry at home. Also, there was a market for their services in America as household servants and factory workers. Women and girls were cheaper to hire than men. Substantial but much smaller numbers of immigrants also came from Germany, Great Britain, and Canada, with French-speaking people predominating among the Canadians throughout the period.

In 1885, the number of Polish people was listed as three. The count increased to 122 in 1895, 586 in 1905, and 1,107 in 1915. Among Polish people, men outnumbered women by about 3 to 2 in 1905 and about 6 to 5 in 1915. The explanation for this disparity appears to lie in the fact that men often came from New York to work as contract laborers, and many were too poor to bring their families with them. First the men saved money to bring the women from Poland. Then, with the men continuing to work as farm hands, the women and children worked a tenant share. The goal was to buy farmland of their own, and in this many succeeded. By the time of World War II, about four-fifths of all Northampton farms were owned by Polish immigrants or their descendants.

The swift change in the ethnic character of Northampton seems remarkable enough when one realizes that for several decades about a quarter of the people came from foreign countries. However, the magnitude of social change is even better understood when the nationality of the parents of Northampton residents is considered, for it is generally accepted that children of immigrants tend to absorb some of the home country traditions and, to some extent, the language of their parents. In 1885, 54% of Northampton residents were native born with at least one foreign-born parent. The proportion in 1895 was 58%. With the slowing down of immigration early in the twentieth century, these proportions fell, of course. The 1970 U.S. Census indicates that in that year only 5.9% were foreign born, and only

amount of error in the sources used (U.S. Census and Massachusetts Decennial) may not be the same. The Massachusetts figures are generally considered the more accurate for that time. The numbers of foreign-born persons may have been undercounted. Most were people of the lower social stratum which it is suspected were commonly less accurately counted.

*Note that these figures are cumulative to an unknown extent. That is, a person counted among the 1,623 in 1905 may also have been counted in earlier censuses.

30.0% were native with at least one foreign-born parent. Among the latter group, people of Polish heritage were most numerous, comprising 8.2% of the total population. Canadians were the second largest group (7.1%), followed by the Irish (3.6%). People designated in the 1970 census as being of Spanish heritage made up 1.6% of the population. They are a relatively new addition to the city's ethnic composition, most having come from Puerto Rico, often after stopovers in larger cities, within the last twenty-five years. Negroes and other races account for only 1% of the population, following a long-standing pattern of very low representation.

Along with the decrease in immigration and the end of the manufacturing boom came a substantial decrease in population growth (see Table 3). The figures for the twentieth century indicate a rather stable community growing at a modest pace. The fluctuations in percent of population change appear to be consistent with historical events such as the depression of the 1930's and the rural-to-urban internal migration associated with World War II. National trends in birth rate are also reflected--for example, the "baby boom" following World War II and the tendency beginning in the 1960's toward fewer children per woman. However, comparison with growth rates for Massachusetts and the United States suggest that local circumstances are largely responsible for the trend in Northampton since 1950 (see Table 4).

Table 4

Population Characteristics: Northampton,
Massachusetts, and the United States

Characteristic	Northampton	Massachusetts	U.S.
Percent population change:			
1940 to 1950	17.2	8.7	14.5
1950 to 1960	3.4	9.8	18.5
1960 to 1970	-1.3	10.5	13.2
Median family income, 1969	\$10,180	\$10,835	\$9,590
Percent of families with income below poverty level, 1970	4.4	6.2	10.7
Median age in years	30.6	29.0	28.1
Percent Negro and other races, 1970	1.0	3.7	12.5
Percent foreign born, 1970	5.9	8.7	4.7
Percent native with foreign parent(s) 1970	30.0	24.6	11.8

Source: U.S. Census

Median income in Northampton is below that of the state but above the national figure, while the city's percent of families with income below the officially defined poverty level is well below the state and national rates. Taken together, these figures suggest a modestly prosperous city unburdened with large-scale poverty problems. The median age is relatively high. A major influence here is the presence of two large health care institutions--the Veterans Administration Hospital and Northampton State Hospital.

C. Land Use

This section of the report provides a brief profile of the characteristics of land use and land use change in the City of Northampton over the past approximately two and a half decades. A general description of land use in the city is presented, followed by a more detailed analysis of land use on the flood plains of the Connecticut and Mill Rivers. The principal purposes of this section are to identify significant factors in Northampton which have tended to influence land use conversion (especially on the flood plain) and to interpret those factors so as to identify land use trends that may affect the future management of flood plain and flood prone lands within the City.

1. General Land Use Features of Northampton

The terrain of Northampton ranges from the moderately steep Berkshire hills of the west to the flat flood plains of the Mill and Connecticut Rivers in the central and eastern portion of the city. Major development to date has occurred in the middle section of the community below the steepest part of the Berkshires and, for the most part, above the flood plain of the Connecticut River. The pattern of development, historically and at the present time, seems to reflect the strong influence of topography and hydrologic conditions. To the west, slopes are steep enough and soils thin enough that development does not occur. Difficulty of the terrain coupled with the uncertainties of onsite waste water disposal through septic systems has effectively restricted most forms of urban land uses; extension of sewer lines into this area in the future can be expected to stimulate significant amounts of new development. Thus the dominant characteristic of the western portion of the city is one of forested slopes interspersed with small streams and pockets of wetlands.

The Connecticut River flood plain has historically been relatively undeveloped, being used primarily for agriculture. During the last two or three decades the agricultural economy of Massachusetts has declined, resulting in abandonment of some of the less economically viable farms from production, both on and off the flood plain. Overall, about 16,000 acres of the almost 23,000 acres of Northampton lands are undeveloped.

Of that 16,000 acres, 3,700 are within flood plain or flood prone areas.

Over the past 20-plus years, there has been urban land use development within the City, mostly in open and unused areas that were contained in the historically developed midsection of the city. Today there is little remaining land available for future development in the midst of the urbanized areas or immediately adjacent to them. Large tracts of public and quasi-public land, including the Northampton State Hospital, Smith College, Arcadia Wildlife Sanctuary, Smith Agricultural School, Look Park, Northampton Reservoir watershed lands and the Veterans Administration Hospital have also contributed to the confinement of the urban development pattern.

A comparison of land use types and their respective acreages is shown in Table 5, which indicates land use changes between 1952 and 1972 as interpreted from aerial photographs by William P. MacConnell of the University of Massachusetts, Department of Forestry and Wildlife Management. One of the major factors which has produced relative stability in Northampton's land use situation over the past two and a half decades has been its slow population growth (see Table 3 above, p. 20). This slow growth trend for Northampton is expected to continue. Table 6 shows population projections from 1975 to 2000 provided by the Lower Pioneer Valley Regional Planning Commission. Total population is expected to increase to approximately 36,000 by the year 2000. For comparison purposes, the table also indicates the projected increases for some neighboring towns in Hampshire County. The City of Northampton Planning Department identifies four future demands that could influence the land use effects of the city's growth. These are (1) the demand for further decentralization of commercial activity from downtown Northampton to shopping centers on the periphery of the city; (2) the demand for increased suburban residential development; (3) the demand for multi-family residential development in response to changing living patterns at the several colleges and the University of Massachusetts, all of which are within commuting distance of Northampton; and (4) the demand for sand and gravel from extensive deposits within the city.

Projections of potential land use changes based on existing zoning appear in Table 7. Since the flood plain is protected by the "special conservancy" provisions of the Zoning Ordinance, most of the conversion of open space land will occur in the western hilly parts of the city, assuming the extension of water and sewer services.

Table 5
Land Use Changes in Northampton,
1952-1972

Land Use	<u>Acres</u>	
	1952	1972
Forest Land	12,552	12,271
Agriculture or open land	6,595	4,742
Wet land	1,121	990
Mining, waste disposal*	--	226
Urban land	2,381	4,044
Outdoor recreation*	--	376
Grand Total	22,649	22,649

*Differences in tabulation are due to the fact that these types were classed as open land in the 1952 aerial photo interpretation.

Source: MacConnell (1973).

2. Land Use Changes on the Flood Plain and Flood Prone Areas

The principal land use within the flood plain of Northampton remains agricultural. Of the approximately 4,700 acres of agricultural land in the town in 1972, slightly over 3,000 acres was in the flood plains of the Connecticut and Mill Rivers. Future projections of land use conversions on the flood plain areas of the city must take into consideration the 1975 changes in the Zoning Ordinance which established a special conservancy in flood plain areas. This law restricts the building of new homes and other structures.

Since 1952 the use of land on the flood plain of the Connecticut River has remained relatively stable. The notable major exception to this was the construction in the early 1960's of Interstate 91 that occupies about 550 acres of flood plain land, most of which was converted from agriculture to highway rights of way. Figures 3 and 4 offer a comparison of land uses on the flood plain in 1952 and in 1972.

Table 6

Population Projections for Northampton and Neighboring Towns

Town or City	Pop. Census 1970	Est. 1975	1980	1985	1990	1995	2000
NORTHAMPTON							
Number	29,664	32,210	32,630	33,160	34,040	34,970	36,110
% Change	8.6	1.3	1.6	2.6	2.7	3.3	
AMHERST							
Number	26,331	33,520	34,760	35,980	37,200	37,990	38,770
% Change	27.3	3.7	3.5	3.4	2.1	2.1	
EASTHAMPTON							
Number	13,012	15,280	16,130	16,750	17,230	17,570	17,830
% Change	17.4	5.6	3.8	2.9	2.0	1.5	
HADLEY							
Number	3,750	3,920	4,070	4,220	4,350	4,500	4,630
% Change	4.6	3.7	3.7	3.1	3.5	2.9	
HATFIELD							
Number	2,825	3,090	3,360	3,650	3,860	3,990	4,060
% Change	9.5	8.6	8.6	5.8	3.3	1.7	

Source: Lower Pioneer Valley Regional Planning Commission.

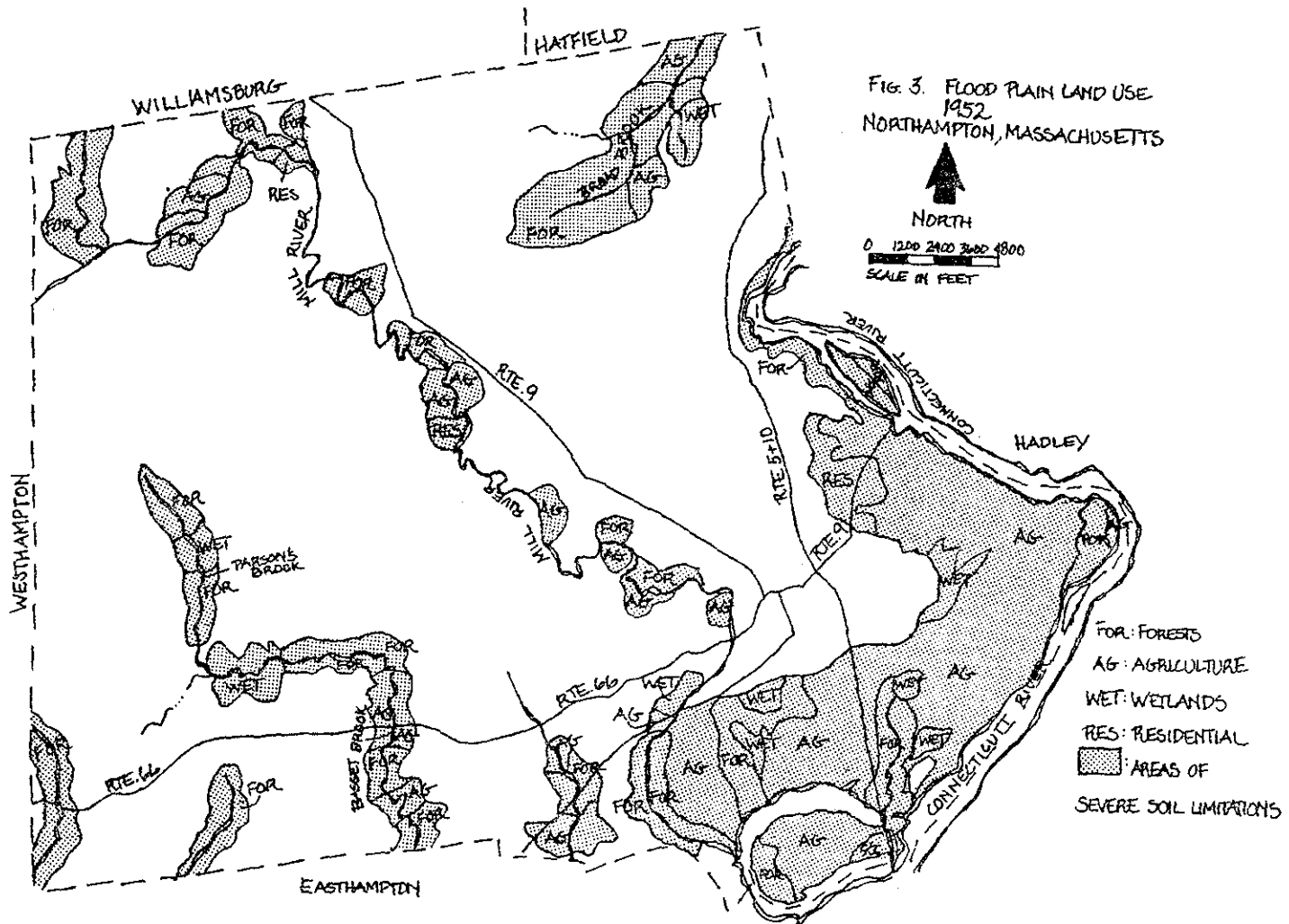
Table 7

Potential Future Land Use
Based on Existing Zoning

Use	Estimated Acres Used	
	1990	At Full Development
Residential		
Urban	900	2,000
Suburban	1,200	2,300
Rural	300	4,600
Commercial		
General Business	150	250
Neighborhood Business	20	150
Industrial	350	1,000
Institutional	550	1,200
Roads	1,300	2,800
Open Space*	<u>18,064</u>	<u>8,534</u>
Total	22,834	22,834

*Includes agriculture, water area, and undeveloped land.

Source: Northampton Comprehensive Plan (1972) as revised by the 1975 Zoning Ordinance.



Location of major utilities is important to flood plain issues in two ways. First, provision of sewer and water services classically encourages higher density of development. Second, the capital value of the services plus the value of development which they stimulate raises the potential dollar value of flood damage. Another important consideration is the risk of damage to utilities from flood waters and resultant land shifts that could produce leaks in gas, water and sewer lines and electrical short-outs. All of these may cause post-flood fire or health problems. With the exception of sewers, all areas of the flood plain are adequately served by major utilities. Where sewers do not exist the Northampton Planning Department reports that persons living in unserved areas have petitioned the town to extend sewer service. High ground water tables in the flood plain area have interfered with effective working of septic systems in those areas.

Some Specific Future Possible Land Use Changes on the Flood Plain Area

Despite the recent zoning ordinance provisions protecting the flood plain and flood prone areas of Northampton, there are several potential situations that might produce development growth in those areas.

The city, in cooperation with the state of Massachusetts, is considering the construction of a regional ice skating rink on the property of the Three County Fairgrounds that lies within the flood plain of the Connecticut.

The recently constructed Ox-Bow Marina is considering an expansion of its facilities and is currently engaged in enlarging the area of its paved parking lot.

In the flood plain of the Mill River there are two possibilities that may influence flood plain development. The first of these is the anticipated construction of an interceptor sewer line down the Mill River Valley from Williamsburg through Northampton to its treatment plant. This would offer opportunity for lateral connectors to areas of the flood plain not presently served by central wastewater management facilities. Second, The Pyramid Company of Hadley, Massachusetts (a subsidiary of The Pyramid Companies of DeWitt, New York) recently purchased 97.3 acres of land in the meadows section of Florence. This land, entirely located on the flood plain of the Mill River, is currently used for agriculture. It is presently zoned for residential use. A wetlands permit and a zoning change would be required for any substantial other development by the Pyramid Companies, a corporation that has specialized in the building of shopping malls.

D. Economic Base

1. Introduction

For many statistical purposes, Northampton is included in the Springfield-Chicopee-Holyoke Standard Metropolitan Statistical Area (SMSA) and Labor Market Area; geographically, however, the City is identified with and more similar in character to towns in Hampshire County. Despite the existence of the I-91 north-south transportation corridor along Northampton's eastern border, which offers commutability and access to the highly urbanized area to the south, the City's predominantly small-town character, both economic and social, dictates that Hampshire County is the most appropriate economic boundary for the region.

Wherever it has been possible, data collected for this study are specific to Northampton; the data were then juxtaposed with either Hampshire County or SMSA data, or a combination. When specific Northampton figures were unavailable, Hampshire County figures were used, since the characteristics of the county closely resemble those of Northampton.

The key to understanding and interpreting the Northampton economic base, as will be shown, is the city's high reliance on service-based enterprises, including education.

2. Historic Trends

Early settlement in Northampton, as in other Connecticut Valley communities, was the result of its proximity to the river and its tributaries. The soils were especially suitable for agriculture and the rivers provided for the transportation of locally grown goods to other parts of the region.

The first manufacturing activities, again spurred by the presence of the rivers, were sawmills and gristmills. Other industries developed to support the increasing settlement in the area. The Mill River, in particular, attracted many factories which produced a broad mix of goods.

When railroads replaced river transportation c. 1865, the area rapidly became more industrialized. Many of the early industries such as the manufacture of cutlery, caskets and coffins, and paper, still exist in Northampton. By the end of World War I, small-scale manufacturing had replaced agriculture as the predominant source of employment. In the 1930's, when low-cost labor induced the migration of industry to

the South from the Northeast, Northampton experienced a decline in its manufacturing base.

The growth of Northampton as an educational center, however, had begun as early as 1832, and by the mid-1940's the number and size of its educational institutions had a significant impact on the City's economy. At present, Smith College, the Clarke School for the Deaf, Williston-Northampton School, and several others are responsible for much of the economic character of Northampton.

3. Economic Base Analysis

An analysis of Northampton's economy requires the examination of a variety of economic and demographic factors at several different time periods. The dynamics of the economic mix are especially important if the analysis is to have any usefulness in identifying future trends. It is also important to identify those economic trends which occur outside the city's boundaries but have an impact on the local economy.

Location-Quotient Analysis

One type of examination of the city's economy can be made through the use of location-quotient analysis, which identifies the relative concentration of a particular good or service within the area under study. Location-quotient analysis begins with the assumption that if a given region produces goods in proportion, in terms of employment, to the amount of that good produced at the national, or larger regional, level, then the region under study is producing just enough of the commodity to be self-sufficient. However, if employment in a particular industry is, for example, three times the proportion of employment in that industry at the national or larger regional level, then it can be assumed that the region is specializing in that industry and will export about two-thirds of its output. Or a community may show a proportion of employment less than the proportion of national or larger regional employment in a particular industry; in that case it can be assumed that the region is importing the particular product or service from other regions to satisfy local demand.

To calculate a location-quotient (LQ) for a particular industry, the national employment figure for each industry in the region is divided by total national industrial employment. Multiplying the resulting proportion by the size of the regional labor market yields a bench mark figure which would indicate that the region is self-sufficient in terms of the product in question. The actual proportion of the local labor force employed in the production of that good, compared with the bench mark figure, indicates the degree to which the region either exports or imports the product.

There are a number of criticisms of this technique, but LQ analysis remains a fast and reasonably accurate way of looking at the structure of a local economy, for indicating the concentration in a particular industry, and for estimating exports and imports of a good or service.

Table 8 presents location quotients based on employment concentrations for Northampton and Hampshire County, 1970 and 1975; Hampshire County and the United States, 1965 and 1970; and for Northampton and the United States, 1970. The unavailability of data precluded the application of the technique to all three area-relationships for all three time periods. In addition, because employment figures used were obtained from different sources, comparability may be open to question. However, the analysis does yield a relatively good first appraisal of the city's economy.

A comparison of the proportion of Northampton's employment in a particular industry to the proportion in Hampshire County provides an indication of the relationship of Northampton to the surrounding county towns. Agriculture, mining, services and transportation, communications, and utilities industries make up Northampton's export base; that is, the city provides goods and services in these industries to other towns within the county. Wholesale and retail trade and manufacturing activities must be imported. The proximity of the construction and finance and insurance and real estate industries to an LQ of 1.0 indicates that the city is self-sufficient in these goods and services relative to the county.

Several trends are apparent from Table 8. In agriculture, 1970, Northampton appeared to have a relatively higher proportion of employment than the United States, while Hampshire County showed self-sufficiency. The LQ of 1.25 in 1970 and 1.5 in 1975 for Northampton relative to Hampshire County indicates that the city serves as an agricultural market for the region, and that the trend increased in the five-year period. A great deal of the mining and quarrying activity within the county is concentrated in Northampton, as shown in the table.

In addition, while Hampshire County apparently imports its construction needs, Northampton essentially provides for its own needs within the county, although this self-sufficiency declined somewhat, since most of the major construction projects of the time period were completed by 1975.

Both Northampton and Hampshire County show relative self-sufficiency in manufacturing when compared with the United States in 1970; but declines in the county as a whole from 1965-1970, and in Northampton relative to Hampshire County, 1970-1975, support the indication that manufacturing in general within the regional economy has declined.

Table 8

Location Quotients, 1965, 1970, 1975*

Industry	Northampton-Hampshire County		Northampton-U.S.	Hampshire County-U.S.	
	1975	1970	1970	1970	1965
Agriculture	1.5	1.25	1.33	.97	1.16
Mining	1.8	.88	.077	.086	.15
Construction	.96	1.3	.95	.73	.70
Manufacturing	.82	.96	1.02	1.06	1.13
Wholesale & Retail Trade	.73	1.35	1.31	.97	.77
Finance, Insurance, Real Estate	1.14	1.2	.59	.49	.48
Services	1.57	.48	.69	1.45	1.65
Transportation, Communications & Utilities	1.6	2.3	1.12	.49	.49

*The formula for location quotients is: $\frac{\text{local employment in industry} \times \text{total regional employment}}{\text{regional employment in industry} \times \text{total local employment}}$ divided by

Note: An LQ greater than one (1) indicates the degree to which the local economy (relative to the larger area) specializes in that industry or is producing more than it consumes locally. An LQ less than one (1) suggests that the area does not meet its own consumption requirements and, therefore, must import that good or service from the outside area. An LQ of one (1) means that the area produces just enough to meet its own consumption requirements.

Source: U.S. Census of Wholesale Trade, 1973 Survey of County Business Patterns.

Wholesale and retail trade has declined significantly in Northampton, down from 1.35 to .726, while the county is more nearly approaching self-sufficiency. This only indicates, however, that the relative concentration of wholesale and retail trade has been increasing in other parts of the county at a faster rate than increases in the city, showing up as an apparent decline in Northampton.

Both the city and the county exhibit importation of finance, insurance, and real estate activities when compared with the U.S., but the high LQ for Northampton relative to the county shows that county finance, insurance and real estate activities are concentrated in Northampton.

Service industry results were as expected. While the comparison with the national bench mark indicates that Northampton is an importer of services, Hampshire County as a whole exports services and the extent to which Northampton contributes to that export activity has been growing.

The high Northampton LQs for the transportation, communications, and utilities industries can be explained by the location of New England Telephone, Western Massachusetts Bus Lines, and Massachusetts Electric in the city. All of these industries service the Hampshire County area.

This preliminary analysis of the relative industrial mix in Northampton provides a general summary of the city's economic base and supports the choice of Hampshire County as the region for comparison. In five out of the eight industries exhibited on Table 8, the City of Northampton is a significant supplier to the county as a whole. With the general findings in hand, each of the industries can be examined in detail, in order to determine the contribution each makes to the city's economic base.

Shift-Share Analysis

Shift-share analysis is a technique used to identify any change in the mix of employment in a region (shift) and compare that pattern of change with that of the national economy (share). The technique is often an effective way of examining the relative changes in the economic base of a community. Shift-share analysis can identify those industries within the region which are growing or declining at the same rate as the national economy and those industries which are moving counter to national trends. By comparing trends of industries in the region with other regions and with the national economy, it may be possible to identify sources of future problems in employment and stability and to promote the expansion of a particular industry that seems to be stable or experiencing high growth.

Shift-share computations commonly use employment as the base parameter, although the same technique can be applied using other data.

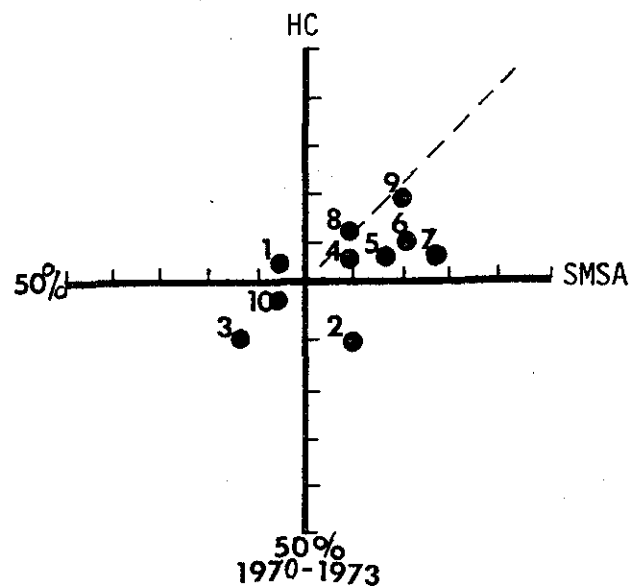
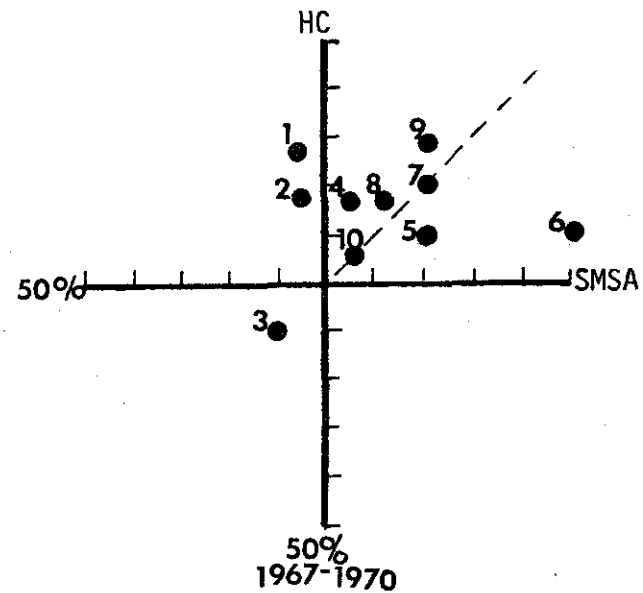
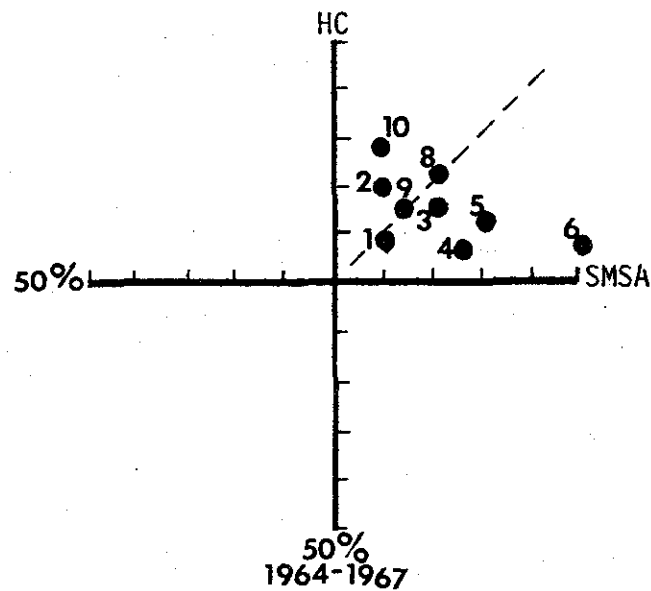
A shift-share analysis begins with the construction of a four-quadrant graph (see Figure 5). On the vertical axis, changes in regional employment are recorded, and on the horizontal axis, employment changes for either the nation, the state, or other regional benchmark economy are recorded. The point at which the two axes intersect represents no change in employment in either area. The upper right quadrant contains observations of industries which are growing in the region and in the nation or other benchmark economy. If, for example, iron and steel manufacturing increased in the region under study by 3 percent, and increased in the nation by 10 percent, a point would be plotted to indicate 3 percent on the Y axis and 10 percent on the X axis.

The 45-degree angle line which runs through the origin of the figure indicates a series of points along which the change in the region is equal to the change in the benchmark economy. If a particular industry increased 10 percent in the region and 10 percent in the nation, it would fall on the dotted line. Any industry to the left of the dotted line is growing at a faster rate in the region than it is in the nation; any industry to the right of the line is growing at a slower rate in the region than in the nation.

In the lower right quadrant, there is a decline in employment in the region, but a positive increase in national employment. Industries in this quadrant may be responding to certain locational disadvantages or are being attracted to a different region.

The lower left quadrant contains those industries which are declining nationally and regionally and the upper left quadrant exhibits industries which are increasing in the region while decreasing in the national economy. Any industry in this quadrant is running counter to national patterns of employment and demand and may not be stable in the future.

In a recently completed study, Housing and Community Development Plan and Program--City of Northampton, by Nicholas and Wasdyke (1977), a shift-share analysis was done for Hampshire County, using the Springfield Standard Metropolitan Statistical Area (SMSA), the state, and the United States for comparisons. The analysis indicates that agricultural employment has declined in the county in the 1964-1973 period. Although Hadley and Hatfield are the largest and most important agricultural towns in the area, the LQ of 1.5 for Northampton suggested that the city's agricultural employment is remaining fairly stable, or is not decreasing as fast as it is in other parts of the county. The fact that farmers in the area are remaining in business suggests that agricultural production in Northampton concentrates on a relatively specialized market and is, therefore, less susceptible to competition from large-scale producers who are responsible for edging marginal producers out of the market. Because agriculture represents such a small proportion of the city's total employment (less than 1%) and total payroll (less than .5%), the future of Northampton's agricultural production will have little impact on these important aspects of the economic base.

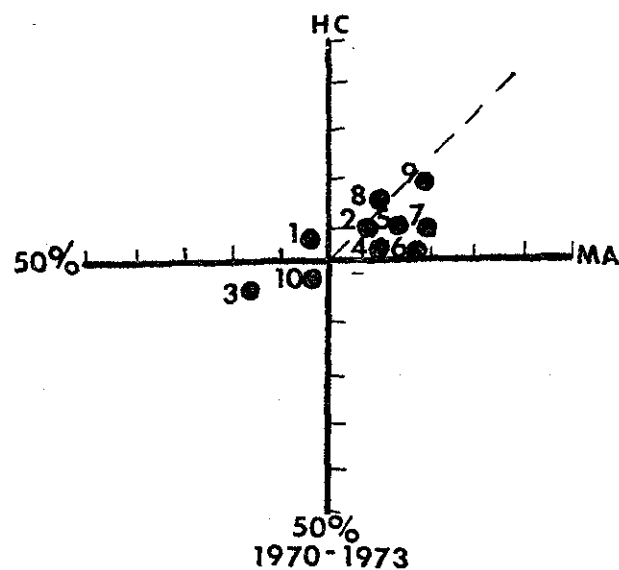
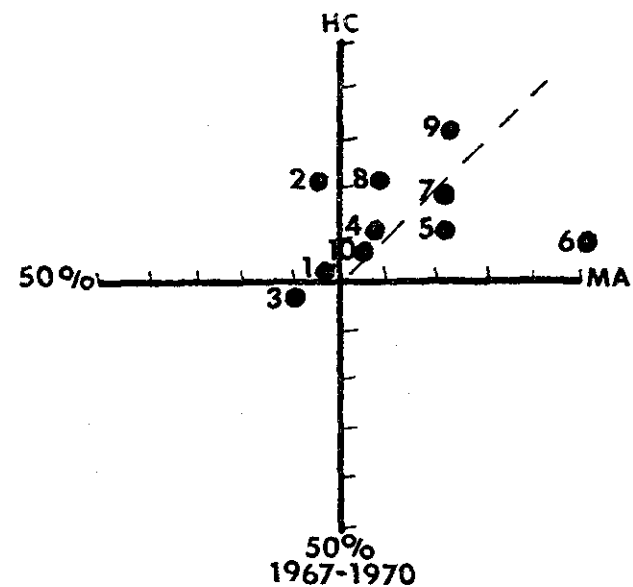
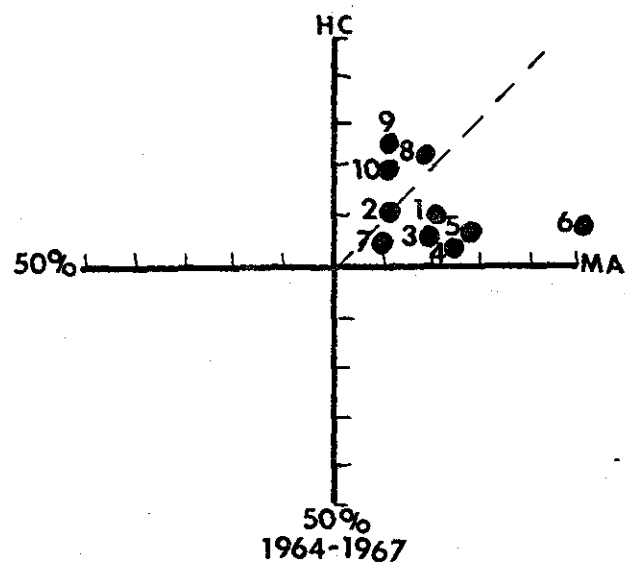


Percent Change in Employment:

1. AGRICULTURE
2. CONSTRUCTION
3. MANUFACTURING
4. TRANSPORTATION & COMMUNICATION
5. RETAIL
6. WHOLESALE
7. BANKING, INSURANCE, & REAL ESTATE
8. SERVICE
9. HEALTH & MEDICAL
10. EDUCATION

Source: U.S. Census, County Business Patterns

Fig. 5. Shift-Share Analysis of Hampshire County Relative to Standard Metropolitan Statistical Area.

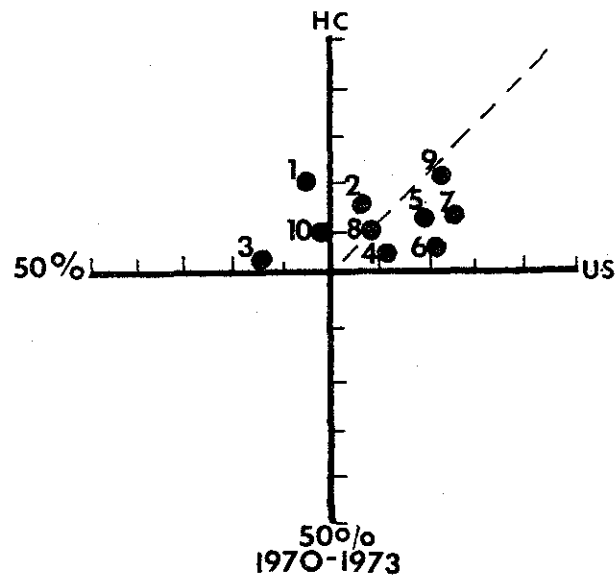
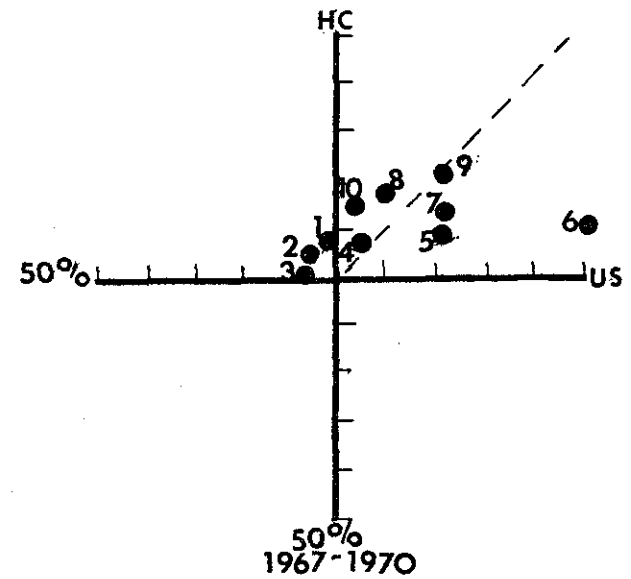
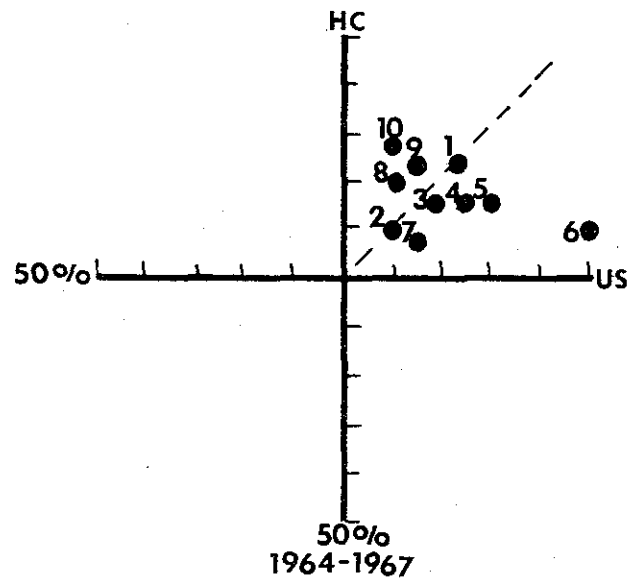


Percent Change in Employment:

1. AGRICULTURE
2. CONSTRUCTION
3. MANUFACTURING
4. TRANSPORTATION & COMMUNICATION
5. RETAIL
6. WHOLESALE
7. BANKING, INSURANCE, & REAL ESTATE
8. SERVICE
9. HEALTH & MEDICAL
10. EDUCATION

Source: U.S. Census, County Business Patterns

Fig. 6. Shift-Share Analysis of Hampshire County Relative to Massachusetts



Percent Change in Employment:

1. AGRICULTURE
2. CONSTRUCTION
3. MANUFACTURING
4. TRANSPORTATION & COMMUNICATION
5. RETAIL
6. WHOLESALE
7. BANKING, INSURANCE, & REAL ESTATE
8. SERVICE
9. HEALTH & MEDICAL
10. EDUCATION

Source: U.S. Census, County Business Patterns

Fig. 7. Shift-Share Analysis of Hampshire County Relative to the United States.

The construction industry is known for its inherent instability. The substantial decline in this activity, evidenced in both the LQ analysis and the shift-share analysis, between 1970 and 1975, illustrates this fact. Most of the major construction projects in the Northampton area were completed during the last five years; any future prospects in the industry will probably be tied to the demand for, and subsequent availability of funds for public works projects. When a great deal of construction activity is taking place, wages are high and labor is used extensively, but the "boom or bust" nature of the industry suggests that it should not be relied on too heavily as a component of the economic base. In 1977, for example, only six new buildings were constructed in Northampton; another eighty-nine were repaired or renovated to some degree. The lack of construction activity in 1977 is significantly different from the level of activity in 1974 when construction employment represented 23.7% of the labor force and 29.3% of total payroll. The credit crunch and recession of 1975-1976 resulted in almost no new housing or capital investment.

Manufacturing data at the municipal level are highly aggregated into major industrial classes, usually at the two-digit Standard Industrial Classification (SIC) level, and are also limited to establishment, employee, and total payroll figures. The county level, however, provides a better source and variety of information, from which Northampton's share within the overall patterns can be estimated.

According to the Department of Employment Security (DES) figures, manufacturing employment has been declining in Northampton since 1974. Shift-share analysis indicates that manufacturing has been declining, in terms of employment, in the general economy. Table 9 provides an illustration of county, state, and national trends in manufacturing for 1963-1972. While absolute employment numbers have decreased since 1967, Table 10 shows that productivity has been increasing. Manufacturing productivity actually exceeded the SMSA, state, and national output per employee in 1972. Rises in productivity can in part be attributed to increasing automation of the production process, an increase in capital intensity which allows fewer workers to generate the same or greater levels of output.

Specific Northampton data are somewhat outdated, but can provide some insight into the nature of manufacturing within the city. In 1974, manufacturing accounted for 23.7% of total employment. (See Appendix A, Table 1.) The extent of change since 1974 is not readily discernible; indications are that the proportion has remained stable or increased slightly.

Sixty and one-half percent of total manufacturing employment was involved in miscellaneous manufacturing, which was aggregated to include one firm in chemicals and allied products; two in stone, clay, and glass products; and one in photographic and optical products.

Table 9
Manufacturing Trends

	1963	1967	1972
Hampshire County Manufacturers:			
Number of establishments	151	156	158
Establishments with 20 or more employees	53	57	59
Total employees	8,146	10,100	8,700
Payroll in millions of dollars	43.1	59.0	72.0
Value added in millions of dollars	83.0	122.0	171.6
Massachusetts Manufacturers:			
Number of establishments	11,311	10,963	10,780
Establishments with 20 or more employees	4,351	4,471	4,161
Total employees	674,000	713,600	625,100
Payroll in millions of dollars	3,737	8,715	10,592
Value added in millions of dollars	65,224	46,463	55,672
Springfield-Chicopee-Holyoke SMSA Manufacturers:			
Number of establishments	979	1,003	1,002
Establishments with 20 or more employees	379	426	392
Total employees	67,400	73,300	62,100
Payroll in millions of dollars	370	463	526
Value added in millions of dollars	690.6	947.7	1,157.0
United States Manufacturers:			
Number of establishments	306,617	305,680	312,671
Establishments with 20 or more employees	99,352	107,138	109,950
Total employees	16,231,900	18,492,000	18,034,400
Payroll in millions of dollars	98,283	123,480	160,433
Value added in millions of dollars	192,082	261,983	353,994

Source: Bureau of Census, U.S. Department of Commerce.

Table 10
Manufacturing Value Added Less Payroll Per Employee

	1963	1967	1972
Hampshire County	4,898	6,237	11,448
SMSA	4,757	6,613	10,161
Massachusetts	4,132	5,706	8,038
USA	5,779	7,490	10,730

Source: Bureau of Census, U.S. Department of Commerce.

Table 11
Eleven Largest Manufacturing Employers in Northampton, 1975

Name of Firm	SIC	Employment	
		1975	1977
VISTRON CORP., PRO-BRUSH DIV. (brushes, plastic bottles)	3079	700	800
KOLLMORGEN CORP. (optical instruments)	3831	225	430
CHARTPAK (chart and graphic paper)	2644	185	
COCA-COLA BOTTLING CO. (soft drinks)	2086	150	
PACKAGING CORP. OF AMERICA (shipping containers)	2653	115	
NORTHAMPTON MFG. CORP. (non-ferrous & ferrous wire)	3357	100	
BERKSHIRE ELECTRIC CABLE CO. (electric cables)	3694	100	
COMMONWEALTH FELT CO. (shoe felt)	2291	80	
GERE, H. S. & SONS, INC. (publishers of newspaper)	2711	80	
NORTHAMPTON CUTLERY (cutlery hand tools)	3421	75	
FLORENCE CASKET CO., INC. (casket and burial supplies)	3994	70	

10 firms employ less than 10 employees; 7 firms employ 10-19 employees; 4 firms employ 20-39 employees; 1 firm employs 40-59 employees; 11 firms employ 70-700 employees = 33 firms total 1975 (down from 41 in 1974)

Source: Massachusetts Industrial Directory, 1975.

Only 2 of the 7 firms reported in this category were among the 12 largest employers in Northampton: Kollmorgen Corp. and Florence Casket Co., Inc. In terms of other proportionate shares of employment, involved in miscellaneous manufacturing; food and related products, paper and allied products, and primary metals had employment shares of 8.0%, 7.9%, and 7.7% respectively. (See Appendix A, Table 2.)

The 11 largest manufacturing employers (1975) are listed in Table 11. Only the paper and allied products industry has two firms on this list, ranking second and fourth in size. An indication that manufacturing activity has increased in the last few years is the apparent increase in employment at Kollmorgen and Vistron. Kollmorgen and Vistron had employment numbers of 225 and 700 respectively in 1975, according to the Massachusetts Industrial Directory, but were reported to have 1977 employment of 430 and 800 respectively, according to a recent article in the Daily Hampshire Gazette. These figures would indicate that both firms have expanded substantially in the past three years.

In a study on Regional Economic Activity in the Lower Pioneer Valley, the strongest net exporting and net importing industries were ranked in descending order:

<u>Strongest Net Exporters</u>		<u>Strongest Net Importers</u>	
<u>SIC</u>	<u>Industry</u>	<u>SIC</u>	<u>Industry</u>
264	Paper Converting	331	Basic Steel (all primary metals)
28	Chemicals and Related Prod.	233	Women's, Misses' outerwear
394	Games, Toys, Sporting Goods	345	Screw Machine Products
30	Rubber and Plastic Products	244	Structural Fabrications
27	Printing and Publishing	20	Food Processing
35	Non-Electrical Machinery		
36	Electrical Equipment		

Five of Northampton's eleven largest firms are strong net exporters, while only three fall into the net importing category. Many of the net export industries are said to be in "high growth" markets, although there are no discernible barriers to expansion of regional capacity among net importers. Kollmorgen, Chartpak, and Vistron all either enlarged their facilities or added to their staffs in 1977 and these three firms represent high net exports for Northampton. Representatives for these firms expressed optimism that recent increases in sales and profits would continue. It appears that these firms are in "high growth" markets and, therefore, will enhance Northampton's manufacturing sector in the future, and increase the flow of dollars into the region.

As indicated in the earlier LQ analysis, Northampton serves as a regional supplier of transportation, communication, and utility services. This sector has been enjoying stable growth in the recent past,

not only in the local economy, but also at the national level. The growth is expected to continue.

Wholesale and retail trade in Northampton accounted for 41.5% of total establishments, 23.7% of total payroll and 30.5% of total employment in 1974. Wholesale trade is a significant part of the region's economy. Hampshire County's share, however, is considerably smaller than Hampden County's (Table 12). Wholesale activity increased 39% in Hampshire County over the 1967-1973 period, but Northampton's contribution to this increase was minimal. Retail activity accounts for the majority of employment in the wholesale-retail trade composite.

The retail sector of Northampton has been characterized as "concentrating in the expansion of activity by developing a broad mix of small, specialized products and handcrafts, all catering to the young adult market." (Regional Economic Activity, p. 24.) Vitality in the Northampton Central Business District (CBD) has been renewed, evidenced by many new store fronts and interior renovations. The CBD appears to concentrate on clothing and shoe shops, with a variety of specialty shops. Increased utilization of second floor Main Street spaces has also been noted; another indication of increasing interest in the CBD.

In Northampton, Route 5 and King Street are main retailing thoroughfares. These areas support four shopping centers containing four chain food stores, three chain department stores, and 15 to 20 small businesses. A number of service stations, automobile dealerships, and fast food outlets also contribute to the commercialization of this area of Northampton. In 1974, general merchandise, food stores, automobile dealers, and miscellaneous retail stores comprised over 70% of Northampton's retail activity. Table 13 illustrates the city's retail trade outlet and sales activities from 1963-1972. While the number of establishments remained unchanged, total dollar amount of sales increased 67% over the decade. This may seem impressive, but when compared with the growth rates of surrounding Hampshire County communities, Northampton's retail growth has been only half as fast as that of Amherst, Easthampton, and South Hadley. The significantly higher growth rates in surrounding towns explain the dramatic decline in the relative concentration of Northampton's wholesale and retail trade from 1.35 in 1970 to .73 in 1975. (See LQ Table 8.)

Vacancies in the four shopping centers along Route 5 average about 10% of total available square footage. The turnover rate within the CBD is also fairly low. Recent occupancy of a gallery of shops called Main Street Center, in a former department store building which had been vacant for four years, is a positive indication that retail activity in Northampton's CBD will continue to be a vital part of the retail base.

Table 12

Whole sale Trade, Hampshire County
and Other Places, 1967-1973

Employment	1967	1973	% Change	
Hampshire County	611	853	+39%	
Hampden County	7,864	9,052	+15%	
Massachusetts	106,089	119,300	+12%	
Hartford County	16,514	19,076	+15%	
Number of Firms	1963	1967	1972	% Change 1963-72
Hampshire County	50	56	76	+32%
Hampden County	629	642	729	+16%
Massachusetts	8,730	8,715	9,227	+ 6%
Hartford County	1,193	1,239	1,345	+13%
Dollar Sales (current dollars)				
Hampshire County	\$ 18.3 MM	\$ 21 MM	\$ 50 MM	+173%
Hampden County	551.8	642	1,008	+ 83%
Massachusetts	10,392	13,157	19,315	+ 86%
Hartford County	1,229	1,646	2,682	+118%

Source: U.S. Census of Wholesale Trade; 1973 Survey of County Business Patterns.

Recently, construction of a new 70 to 80 store shopping mall has begun in Hadley, a town which abuts Northampton to the east. Its impact on Northampton's share of retail trade will depend on the kinds of businesses which locate in the new mall. The presence of a major department store should not seriously impact Northampton's retail sector because of the City's tendency toward specialized retail activities and because of the location of Smith College, which abuts the CBD.

Finance, insurance, and real estate activities appear relatively stable in the Northampton area. These activities have tended to cluster in Northampton, which, as the county seat, supported the surrounding area in this field. The concentration of activities has declined, primarily because of an increase in branch-banking throughout the area during the past four years. It can be suggested, then, that the increases in retail trade noted above account for comparable growth in finance, insurance, and real estate. It is not likely that this sector will undergo more expansion, however, as the retail market in Northampton approaches saturation.

Table 13
Retail Trade Outlets & Sales Activity, by Community, 1958-1972

	No. of Establishments					Total Sales, \$000, Reported				
	1958	1963	1967	1972	% Change 1963-72	1958	1963	1967	1972	% Change 1963-72
HAMPSHIRE COUNTY	1002	896	952	1081	21	87,697	100,364	143,079	213,663	113
Amherst	104	81	100	159	96	10,992	13,174	15,581	31,293	138
Belchertown	n.a.	n.a.	n.a.	40	--	n.a.	n.a.	n.a.	4,641	--
Easthampton	144	118	121	138	17	11,139	11,703	16,826	25,112	115
Northampton	330	295	296	296	0	38,477	50,981	66,096	85,090	67
South Hadley	70	73	83	103	41	5,120	5,067	8,557	17,277	241
Ware	129	126	114	108	-14	10,332	13,479	15,058	17,413	29
Balance of County	225	203	238	277	36	11,637	11,758	20,961	37,478	219

Source: U.S. Census of Retail Trade.

Smith College, The Veterans Administration Hospital, Northampton State Hospital, and Cooley Dickinson Hospital account for almost half of the service employment in Hampshire County. Smith College is relatively labor intensive and attracts large sums of money from outside the region. Both the V.A. Hospital and the State Hospital, while providing local employment, are government supported and funded; the facilities offer a secure base, but an indefinite future for increased employment opportunities. In 1977, Smith College and the V.A. Hospital increased their staffs by 30; Smith now employs 1,290 people and the V.A. Hospital employs 927. Their joint payroll exceeds \$28 million, almost one and one-half times total manufacturing payrolls.

City and county government service employment accounts for no more than 5% of Northampton's total employment.

Although the predominance of a service-based economy in Northampton might provide some stabilization in an economic downturn, that sector, particularly as in Northampton, soon reaches capacity and offers no inherent potential for employment increases.

4. Labor Force Analysis

Finally, a look at the aggregate labor force will complete the survey of Northampton's economy. Total employment in the city increased steadily through 1974, but showed some signs of decline in 1975. It should be noted, however, that unemployment peaked at 11.3% in 1975 and was reported to be down 7%, at 4.6%, by 1977, indicating that employment is on the rise. The total population of the city has increased only 1.7% in the last seven years.

The distribution of the population by industry and occupation is based on 1970 Census data. It is not known to what extent these patterns still apply. For the most part, the results support the trends identified within the industries.

A comparison of Northampton with the state and SMSA populations (Appendix A, Table 3) shows that Northampton's employed residents are principally engaged in nondurable goods manufacture, communications, other personal services, hospital services, private and public educational and related services, legal and engineering services, and miscellaneous industries. These comprise a greater proportion of the city's employment than the proportion in either the SMSA or the State. In the aggregate, 33% of Northampton's population are employed in services, followed by manufacturing in which 20.8% of Northampton's population were employed in 1970.

Another way of characterizing the labor force is by occupation (see Appendix A, Table 4). At the general level, 19.4% of the city's labor force were professional, technical and kindred workers; 18.2% were clerical and kindred workers. Both of these are understandably significant proportions of the labor force as the former category includes health and educational employment and the latter is a necessary component in a service- and retail-dominated economic base. Service workers--those employed in cleaning, food, health, personal and protective services--constitute the largest occupational group at 19.7%. Craftsmen, foremen and kindred occupations accounted for 11.1% and operatives, excluding transport operations, 11.9%. The 1970 industry and occupational characteristics of the city's population reflect equivalent proportions in industry mix, as previously noted.

The income distribution of the population further reflects the existing industry structure. The Marketing Economic Institute of New York has estimated the following distribution in income:

<u>Income Range \$</u>	<u>% of Population</u>
Less than 3000	10.5
3000- 5000	7.5
5000- 8000	13.4
8000-10000	10.8
10000-15000	23.0
15000-25000	21.7
25000 or more	13.0

Source: Daily Hampshire Gazette,
February 10, 1977).

Over 65% of the population earn incomes of less than \$15,000.00 per annum. It has been suggested that Northampton does not provide a very attractive opportunity for persons interested in advancement or a diversity of economic opportunities. Service industries employ technically highly skilled people and the retail sector is dominated by many small single proprietorships and partnerships, which represent a low demand for personnel. The concentration of incomes in the lower ranges reflects the predominance of these service and retail sectors in the local economy.

5. Public Services and Taxation

Of importance to both the business and residential communities are the quantity and quality of public services. An examination of city budgets for the last ten years reveals that, like most municipalities in the country, Northampton has steadily increased its expenditures, at an average rate of 20.6% per annum. The property tax rate has been

increasing steadily, but not dramatically, with comparable increases in the City's tax base (Table 14).

Table 14

Tax Rates and Assessed Valuation, 1966-1976

Year	Tax Rate	Assessed Value
1966	\$87.00	\$ 44,235,000
1967	87.00	45,417,172
1968	42.00	134,826,975
1969	44.00	137,025,490
1970	54.00	140,887,010
1971	50.00	143,706,295
1972	53.00	147,459,050
1973	54.00	150,805,045
1974	56.00	157,602,490
1975*	56.00	157,602,490
1976*	56.00	162,000,000
1977*	61.00	164,000,000
1978*	62.00	183,188,000

*Figures obtained from Mass. Taxpayers Foundation, Municipal Financial Data, 1976.

Source: The City of Northampton Annual Reports, 1966-1974.

Northampton revalued property in 1968, accounting for the substantial increase in assessed valuation that year, as indicated in Table 14. The rise in the property tax rate indicates not only the fact that expenditures have been increasing, but also the decrease in the assessment ratio since the 100% base of 1968. In 1976, for example, the assessment ratio was reported to be 71% of market value.

In order to minimize pressures on the tax rate as expenditures increase, Northampton will undoubtedly be concerned with maintaining its non-residential tax base. The presence of so many land uses which have tax-exempt status, most notably Smith College, Cooley Dickinson Hospital, the V.A. Hospital and the court houses (Table 15), places an increasing burden on residential taxpayers to absorb the increases in government service provision. To what extent complete occupancy of an already developed industrial park and the commercial projects in the downtown area will offset the residential tax burden and for how long, will be a prime concern for the city in future years.

Table 15

Property Exempt from Taxation
(Non-Taxable Real Estate Only)

American National Red Cross
Betty Allen Chapter D.A.R.
Children's Aid and Family Services of Hampshire County, Inc.
Childs Park Foundation, Inc.
Clarke School for the Deaf, The
Connecticut Watershed Council, The
Cooley Dickinson Hospital
Florence Civic and Business Association, Inc., The
Hampshire, Hampden & Franklin Agricultural Society
Hampshire Regional Y.M.C.A.
Hill Institute
Jerusalem Lodge Building Association, Inc.
Lathrop Home for Aged Women in Northampton
Massachusetts Audubon Society
Michael F. Curtin Post #8006 V.F.W. Home Association
New England Deaconess Association
Northampton Grange #138, Patrons of Husbandry, Inc.
People's Institute of Northampton, Inc.
Smith's Agricultural School
Trustees of Smith College, The
World War II Veterans of Hampshire Co., The
Western Massachusetts Girl Scout Council, Inc.
Churches and Chapels
Parish Houses or Parsonages
Cemeteries
Property of the United States
Property of the Commonwealth of Massachusetts
Property of Hampshire County
Federal Public Housing Authority Florence Heights and
 Old South Street
Northampton Housing Authority--Chapter 200--
State Aid Housing Projects: Hampshire Heights, Fruit
Street & High Street, Florence
St. Michael's School Association
Annunciation School
St. John Cantius Parish Hall

6. Summary and Conclusions

In summary, Northampton can be characterized as a regional market place for the surrounding rural towns and agricultural areas. The pre-dominance of service-related activities and small retailing firms as sources of employment has helped to maintain a semi-rural, small town character. The existing manufacturing is concentrated in several large firms, with the balance distributed among many firms employing 15 people or less. The newly developed industrial park will help to preserve the city's small town atmosphere by providing a location alternative for manufacturers who wish to expand their operations and by providing an opportunity for new enterprises to locate in Northampton. The park will also preserve the export advantages of the city's manufacturing base. The growth of general merchandising activity in Hadley and surrounding towns may lead to the saturation of retail activity within Northampton, given the tendency of the city toward small, personal businesses specializing in hand-crafted and other novelty items. The service sector, similarly, will probably not expand in the near future because the several facilities are currently used at capacity and have not indicated any plans or need to expand.

While the city's economic mix seems to have stabilized for the short run, the extent that property taxes continue to rise, applying an increasing burden on the residential tax base, will determine, if anything will, what development pressures will ensue in the future to enhance the non-residential tax base. Although Northampton is north of and therefore removed from major east-west transportation routes, the access to I-91 on its eastern boundary may be a primary influence in the encouragement of manufacturing and other non-residential activities necessary to offset growing pressures on the tax rate.

Future Industrial and Commercial Development in the Flood Plain

It seems very unlikely that any substantial industrial or commercial development will be undertaken in the Northampton flood plain area, for the following reasons:

- 1) New industrial activity would probably find the industrial park a more attractive and viable site than the flood plain. The park has been prepared, utilities are in place, and site planning and building assistance are available. For the type of small-scale manufacturing that Northampton seems to attract, the park would seem to be the more attractive alternative.

- 2) Commercial or retailing development seems to have reached a saturation point in Northampton proper with the major expansion taking place to the east in Hadley and to the south in Holyoke.

3) Existing industries within the flood plain, with one exception (Vistron), show little inclination to expand their Northampton operations. (See the discussion of flood plain business interviews below, pp. 125-129).

4) The restrictions currently applicable to development in the flood plain, along with the attendant appeals processes, discourage business expansion. Vistron's tentative plans for expansion have been slowed. LaFleur's experience in replacing an aircraft hangar and the inability of the Colonial Hilton to use or dispose of additional acreage for commercial use also illustrate the difficulty faced by existing flood plain businesses.

E. Flood Hazard Management

Three types of programs designed to reduce flood hazards have been implemented. They are structural works, flood plain use regulations, and the organizational capacity to provide various emergency services. This section summarizes the most immediately salient programs as they apply particularly to Northampton.

1. Structural Works

Major Structures on the Connecticut River and Its Main Tributaries

As mentioned above, there are nine existing dams and reservoirs and a dike and flood wall system which afford protection against flooding in Northampton. According to Corps of Engineers estimates, these structures are sufficient to prevent flooding of diked areas of the city in the event of another flood similar to the one in 1936. However, they would not protect against what is called a "standard project flood" or SPF. This term, as defined by the Corps, means:

The flood that may be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40 percent to 60 percent of the Probable Maximum Floods for the same basins. [SPF's], as used by the Corps of Engineers, are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

If a flood similar to 1936 were to occur now, with the existing structures in place, the water would rise in Northampton to about 126.3 feet above mean sea level (msl), well below the top of the dikes which are at 132 feet msl. But the SPF would rise to about 132.6 feet msl, overtopping the dikes and damaging the city. The probability of such a flood occurring is not known because of the extreme difficulty involved in predicting rare events.

For those reasons, an additional 7 dams had been recommended for the Connecticut Basin; they were part of the plan adopted by Congress in 1938. The Corps continued until 1970 to advocate construction of the dams and implementation of other measures to complete the plan and provide protection against overtopping the dikes. In the case of Northampton, completion of the proposed dams would reduce the 1936 flood level to 121.8 feet msl and the SPF level to 129.6 feet msl or 2.4 feet below the top of the city's dikes. Another proposal is to raise the elevation of the dikes to 135.6 feet msl. This, without the additional dams, would also provide sufficient protection against the SPF for diked areas. By 1970, non-structural measures were receiving increasing attention; the basin states had withdrawn their support for the dams; and the National Environmental Protection Act of 1969 was in effect. This act requires consideration of a wide range of social, economic, and environmental factors before major federal actions are taken. The issues related to further construction are too numerous and complex to cover here; however, it can be stated that state governments of the basin and the NERBC are definitely inclined toward reliance on non-structural measures along with perhaps raising dikes at appropriate locations, including Northampton.

Headwater Structures

The Watershed Protection and Flood Prevention Act of 1954 (P.L. 83-566) authorized the U.S. Soil Conservation Service (SCS) to construct small watershed projects in the small streams of headwater areas. Known as the P.L. 566 program, these projects may include dams and flood storage reservoirs and stream channel work. The scale of these projects is much smaller than the main stem works discussed above. Existing small watershed projects account for about 6 percent of the total flood storage capacity provided by all structures. As of 1976, there were ten small projects in the Connecticut Basin--six completed and four nearing completion.

The Northampton Conservation District, the local cooperating agency with SCS, requested the SCS to provide a watershed management plan of Mill River headwater areas which would include flood control storage. Preliminary studies were done, but because agreement on various elements of the plan was not reached, the Conservation District withdrew its request. The SCS no longer has an active file for the project.

2. Flood Plain Regulations

Flood plain regulations are intended to limit further development in flood hazard areas and to reduce potential structural damage by flood proofing buildings. Limiting development accomplishes two purposes with respect to flood hazard control: 1) it keeps people and their buildings out of the way of floods so that personal and economic risks do not continually increase, and 2) it allows flood plain areas to function as natural, temporary storage areas for flood water. The Northampton section of the Connecticut River flood plain is part of an area extending from Montague to Holyoke that has been identified as significant in terms of its natural storage capacity. It is one of seven such areas in the Connecticut Basin--four along the main stem and three along major tributaries. The downstream benefits of natural flood water retention areas are sharply illustrated by the 1874 Mill River disaster when the Florence meadows effectively prevented damage to Northampton center.

Impetus for controlling flood plain development comes from the fact that the human and dollar costs of flood damage keep on going up despite the presence of flood control structures. The rate of increase in dollar losses from 1952 to 1968 was more than 20 percent annually. Every new building simply adds to potential future losses.

Flood plain controls are embodied in a mass of laws and regulations at the federal, state, and local levels of government. Since the federal flood insurance program is now, in effect, the centerpiece of the legal structure, the discussion will begin with it.

The National Flood Insurance Program

The National Flood Insurance Act of 1968 (P.L. 90-448) was passed in response to growing amounts of flood damage and human suffering, the severe problems people experienced in trying to buy flood insurance at a price they could afford, and the rising costs of disaster relief aid. The act was a limited experiment in making subsidized insurance available primarily for residences and small businesses. In recognition of the fact that new flood plain development increases potential flood damages, the act also required eventual adoption of flood plain land use regulations by localities if they wished to participate in the program.

The Secretary of the Department of Housing and Urban Development (HUD), in cooperation with insurance industry representatives, is authorized to establish two premium rate schedules for insurance for property in flood prone areas. One, the actuarial rate, was based on anticipated flood risks plus reasonable costs of providing and servicing the insurance. The other is a subsidized rate set low enough

to attract buyers. The subsidized rate is available to owners of existing property, while the actuarial rate has to be paid by owners of newly built structures. The insurance is provided by a pool of private insurers, with the federal government making up the difference between the two rates through a National Insurance Fund. The HUD agency responsible for administering the program is the Federal Insurance Administration.

The Flood Disaster Protection Act of 1973 (P.L. 93-234) was a response to the ineffectiveness of the 1968 act. Flood plain development was continuing, disaster aid costs were still rising, and the essentially voluntary program was not attracting much participation. Part of the problem was the low amount of insurance coverage allowed in the original program--only \$17,500 for a single family home plus \$5,000 for its contents. To make the program more appealing, these limits were raised in 1973 to \$30,000 and \$10,000, and subsequently to \$70,000 and \$20,000. The more significant problem in a long-term sense was handled by making it almost imperative for communities with flood prone areas to join the program. This was accomplished by forbidding federal loan guarantees for the purchase or construction of property in identified flood hazard areas unless the properties are insured with flood coverage. Included are bank loans guaranteed by the Veterans Administration, the Farmers Home Administration (FHA), and the Small Business Administration (SBA). If an owner of a house or business wanted to sell or get a loan for improvements, he would probably have to buy flood insurance first. But for him to do that, his community would first have to institute acceptable (to HUD) flood plain regulations so the community could join the insurance program. The attractiveness of the higher insurance levels, and especially the potential consequences of non-participation to local economic well-being, may be producing the desired results.

Precise information concerning the boundaries of flood hazard areas is necessary before actuarial premium rates can be established accurately for individual properties and before local governments can map land use control zones. Therefore, participation in the program has been divided into two phases. Enrollment in the "emergency" phase begins with preparation of a flood hazard area boundary map that indicates the approximate extent of the 100 year (1 percent) flood based on existing information. The locality makes an initial commitment to flood plain regulation, perhaps only requiring flood proofing for new structures within the hazard area at first. Regulations are expanded incrementally as more detailed information becomes available. When a flood insurance rate map is available, actuarial premium rates are set and the community completes its system of regulations. It then joins the "regular" phase of the program. Rate maps are far more detailed than hazard area maps and often require the collection of a substantial amount of new information before they can be completed. Both kinds of maps are produced for HUD by other government agencies or private firms. The Corps of Engineers, SCS, U.S. Geological Survey and other federal agencies are particularly important contributors to the information gathering and mapping processes.

Briefly, HUD requires localities to prohibit new development or substantial expansion of existing structures in the floodway if an increase in flood levels would result, and to prohibit any filling or other encroachment in the floodway unless it is offset by stream channel modifications to compensate for the lost flood carrying capacity. The floodway is defined by the Corps of Engineers as:

The channel of a watercourse and adjacent land areas required to carry and discharge a flood of a given frequency--specified as the one percent for the administration of the National Flood Insurance Program--within a regulated flood hazard area without substantially increasing flood heights. Minimum standards of the Federal Insurance Administration (FIA), Department of Housing and Urban Development (HUD), limit such increases in flood height to 1.0 foot, provided that hazardous velocities are not produced.

On the remainder of the 100 year flood plain, all new or substantially improved residences must be built with the lowest floor above the level of the 100 year flood. Other types of structures must be raised or flood proofed to the same level.

In addition, the flood insurance legislation gives discretionary authority to the federal government to buy insured properties that have been destroyed or severely damaged by floods and turn them over to local governments for suitable uses such as recreation or nature preservation areas. The purchase may be in full or in part (perhaps only development rights or a conservation easement). This is expected to be done only infrequently, but it does provide a means to prevent recurring losses in particularly hazardous locations or areas of unusual importance for natural flood storage.

State Authority for Local Zoning Ordinances

The authority Northampton has to impose zoning and building code regulations is granted to the city by The Zoning Act, Chapter 40A of the Massachusetts General Laws. Chapter 40A establishes the basic administrative structure and procedures for local application of zoning controls. As it applies in Northampton, Chapter 40A makes the City Council responsible for adopting and amending the zoning ordinance after a public hearing and receipt of a report with recommendations from the Planning Board. Zoning districts for different kinds of land use may be established so long as the regulations are uniform for each type of structure or use within a district. The districts must be shown on an official zoning map. Special permits for uses not ordinarily allowed in a particular district may be granted by the Board of Appeals or other appropriate authority. In Northampton, special permits are granted in most cases by the Board of Appeals. The Planning Board or City Council is the authority for exceptional uses such as cluster housing or subdivisions.

Three other parts of Chapter 40A have a specific bearing on Northampton's flood plain use and regulation. First, agricultural use of land may not be prohibited, unreasonably regulated or subjected to a special permit process in any zoning district on parcels of land more

than five acres in size. Existing buildings used primarily for agricultural purposes may be expanded or reconstructed under the same exemption. Second, a local ordinance may not exempt land or structures from wetland or flood plain regulations established under the state's general laws. And third, a local ordinance may not alter provisions of the State Building Code.

State Building Code Flood Proofing Requirements

Article 7, Section 748.0, of the Massachusetts Building Code outlines the general design requirements for flood plain and coastal high hazard areas. These requirements, along with the specific details that accompany them, satisfy HUD criteria for flood proofing which must be met for qualification for the flood insurance program. Structures must be anchored to prevent movement or collapse during anticipated flood conditions; approved flood resistant materials and equipment must be used; and the elevation relative to mean sea level must be shown on plans for new or substantially improved buildings proposed for flood hazard areas.

Permits to Fill in Wetlands

In Massachusetts, a total of four permits is required before filling is allowed to be done in an inland wetland or watercourse, including the areas next to waterways that are subject to flooding. This system of permits is an important element in flood plain management in its own right, and particularly when viewed in relationship to the flood proofing requirements of the flood insurance program which, in practice, can most often be partially satisfied by filling under the foundation area.

Required are a permit and order of conditions from the local Conservation Commission, a license from the Massachusetts Department of Environmental Quality Engineering (DEQE), a water quality certificate from the State Waterways Division, and a permit from the Corps of Engineers. The latter two permits were originally intended to protect the navigability of rivers. The Corps' permitting authority began as long ago as 1899 and applied only to watercourses. Based on Section 404 of the 1972 Water Quality Act Amendments and the 1977 Clean Water Act, the "Section 404" permit program now applies to inland wetlands including areas contiguous to rivers and subject to flooding. The Waterways permit is required under the Massachusetts Dredge and Fill Act.

Although the areas of jurisdiction and criteria for review of fill applications of these four agencies are not identical, in general the filling action must be in the public interest and with no practical alternative to it. Various other considerations are taken into account, such as the effects on wildlife habitat, fisheries, and endangered species; the consequences to navigation where applicable; and the quality of the fill itself. Only clean fill (that is, naturally occurring inorganic materials of suitable engineering characteristics) is allowed, in order to avoid polluting the wetland or watercourse.

For all of these permits the definition of an inland wetland is similar. Essentially, it is an area where seasonal or permanent inundation results in wetland plant communities which can be identified by the presence of particular species of plants. In practice, determination of the precise boundary of a wetland is based on the judgment of appropriate experts.

Massachusetts' Inland Wetlands Protection Act of 1968 as amended in 1972 and 1974 is the basis for state wetlands regulation. Its origin was independent of the flood insurance program; the act is regarded as a pioneering effort in this area of state legislation. The act, Chapter 131 of the General Laws, prohibits dredging, filling, polluting, or other alteration of protected areas without a permit, except for a very few minimal activities related to access roads, utilities, and agriculture. The area of protection includes wetlands plus an additional 100 feet next to them. The Conservation Commission is the local permitting authority. Acting in this capacity, the Commission reviews applications and establishes any special conditions that must be met in carrying out the proposed activity.

Zoning Ordinance of the City of Northampton

Northampton's Zoning Ordinance of 1975 and amendments of 1978 contain provisions which were specifically intended to comply with federal insurance program criteria and be consistent with inland wetlands regulations. Northampton enrolled in the emergency phase of the insurance program in 1972 and has proceeded to augment and refine its flood plain zoning in order to achieve eligibility for the regular phase. In 1975, Articles XIII and XIV were added to the Zoning Ordinance. They state use and permit conditions which must be met for new development or substantial improvement of existing structures in the 100 year flood plain and other areas. The city's Flood Insurance Rate Map became available in 1977 so that refinements to the zoning map could be drawn. Map adjustments and changes in wording of the ordinance were approved on April 28, 1978, completing requirements for eligibility

of the city to enroll in the regular phase.

The areas subject to special flood plain regulation are included in a Special Conservancy (SC) District and shown on a watershed protection overlay to the zoning map. Areas covered by the overlay are currently zoned for various types of residential and business uses, but the watershed protection regulations are in addition to and take precedence over all other rules that normally apply to such zones. Northampton has no agricultural zone as such, although it is city policy to encourage retention of agriculture and, of course, Chapter 40A's provision against restricting agriculture in any zone applies.

In the SC District covered by Article 13 of the Zoning Ordinance, agriculture and noncommercial forestry and vegetable growing are allowed by right. Only a limited number of other uses are allowed at all, and these by special permit. These uses include residences on lots of 50,000 square feet or more, municipal and utilities facilities, commercial outdoor recreation, greenhouses or stands for the sale of agricultural products, removal and processing of sand and gravel, filling of water or wet areas, historical association uses, and a few other specialized functions. The special permit (with conditions) can be granted only after a hearing and a thirty-day period for review of the application by the Conservation Commission, the Board of Health, and the Planning Board. Applications must include detailed plans showing, among other things, the locations of buildings, watercourses, means of access, and sewage disposal facilities; and the elevations of the first floor and basement. Permit conditions are that the lowest floor of residences is above the 100 year flood level; the lowest floor of other structures is at the same level or flood proofed according to State Building Code requirements; and that there is no danger of pollution to any public or on-site water supply.

The Watershed Protection District, established in Article XIV and shown on the map overlay, permits municipal uses such as waterworks, pumping stations, and parks. Other uses allowed in the underlying zoning districts require a special permit from the Zoning Board of Appeals. Any dumping, filling, excavating, or earth moving also requires a permit. The interagency review and plan submittal of the SC permitting process applies. The permit requirements are more extensive and are designed to fit wetlands circumstances that are found outside the 100 year flood plain as well as within it. Public water supply is mandated. Both it and any public sewerage system must be designed to prevent infiltration of flood water. Percolation tests for septic systems have to be conducted at least twice, and leaching fields must be at least four feet above the maximum groundwater elevation. The floor level of living or working areas is to be at least four feet above the seasonal high water level. First floor elevations and flood proofing are otherwise the same as for the SC District. Safety to utilities must be demonstrated as well as protection against storm water runoff that might raise water levels on other

property or increase danger from floods. Roads and driveways may not cause unwarranted diking. Finally, the landfill or use may not increase the 100 year flood level at any point.

Clearly, these articles meet or exceed flood insurance program criteria and support the intent of state wetlands law. The city's zoning ordinance reflects not only the requirements imposed by other authorities but also a local commitment to long-range flood plain and wetlands protection.

3. Emergency Programs

Government programs directly concerned with flood emergencies include actions taken before, during and after a flood and the responsibilities involved are shared among federal, state, and local agencies. Flood warning and evacuation and disaster relief are of prime importance.

Flood Warning and Evacuation

Flood warning and evacuation programs obviously do nothing to control flooding itself, but they do make it possible to reduce significantly the resulting damage, particularly with respect to human suffering and loss of life. Compared to the total property loss from a large flood, the value of property saved by timely removal and instituting emergency procedures may not be great, but it is nevertheless worthwhile.

The National Weather Service collects and evaluates weather and stream flow information so that it can forecast floods and issue warnings as necessary. In the Connecticut Basin, these functions are the responsibility of the River Forecast Center in Hartford, Connecticut. Weather and flow information is collected through direct physical observation (i.e., river gauges) and telemetering devices. The raw information is processed with the assistance of computers. The amount of time between a flood warning and an actual flood varies with the extent of information available, the sophistication of available evaluation techniques, and the characteristics of streams in a given location. Twelve hours is normal for the Connecticut River in Northampton, with much shorter times for streams normally subject to flash flooding. In the event that a flood seems probable, monitoring and dissemination of information are carried out as fully and continuously as possible.

Local agencies are most immediately involved in warning and evacuating endangered people, with state and federal assistance available according to the seriousness of the situation. In Northampton, implementation of the warning and evacuation system is keyed to rising

levels of the rivers. For example, if the Connecticut reaches 105 feet, a flood watch begins, appropriate agencies are notified, and police road patrols are sent out. At 107 feet, two streets are closed. At 112 feet measures are taken to preserve the integrity of the sewage treatment facility. As the water rises, further precautions are taken, an emergency headquarters is activated, and the Director of Civil Defense assumes control of coordination. At 127 feet, the mayor declares a state of emergency. In the meantime, coordination with state officials has been maintained so that a variety of coordination, communication, and technical assistance is available as well as help from the State Police and National Guard. The state acts as liaison with federal agencies. Federal disaster relief becomes available if the President, at the request of the Governor, declares a state of emergency. The entire system is intended to assure that the necessary personnel, equipment, and supplies are all in the right place at the right time. Thus, the key elements of an effective warning and evacuation system are a workable plan, weather and stream flow information and forecasts, a functioning communication and coordination system, trained personnel, and availability of equipment and supplies.

Disaster Relief

Disaster relief also involves a highly complex set of actions at all levels of government. Federal assistance is available for catastrophes such as major storms, earthquakes, droughts, or fires. Since disastrous floods affect virtually all programs and services provided by government, the number of agencies that are affected in one way or another is very large. Furthermore, federal assistance involves both short-term efforts to cope with immediate problems and long-term help in restoring the social and economic well-being of the stricken area.

The federal government's role is defined primarily by the Disaster Relief Act of 1970 as amended by the Disaster Relief Amendments of 1974 (P.L. 93-288). The full range of federal actions is triggered by a Presidential designation of a major disaster area; the assistance supplements the efforts and resources of local and state governments and relief organizations and it is under the direction of a coordinating officer of the Office of Emergency Preparedness.

Federal short-term assistance includes providing emergency support teams composed of "borrowed" agency personnel; lending equipment and providing emergency shelter, food, clothing, and medicines; and helping to remove debris and wreckage and restore public services.

Much of the longer-term assistance is in the form of financial aid supported by technical advice; it supplements rather than replaces whatever other resources, such as insurance, there are. The government makes available to individuals or corporations loans at less than commercial interest rates for repair or replacement of homes, farms,

and businesses. Loans may be made to industrial, commercial, or agricultural enterprises that constituted major sources of employment in the local economy without regard to normal limitations on loan size in order to help restore the economic viability of the locality. The loan programs are administered by the Farmers Home Administration and the Small Business Administration. Temporary rent or mortgage payments, food stamps, legal assistance, and unemployment compensation are offered to individuals. Local governments may be given grants to offset property tax losses for a period of up to three years, and contributions may also be made to states and localities for restoring or replacing public facilities. The law also provides for special handling after a disaster of program regulations and outstanding loans related to projects for rural electrification, low-income housing, and many others.

There is a stipulation in the law which has implications for flood plain management and future flood risks. Financial assistance is available for buildings in identified flood hazard areas only if they are covered by flood insurance. If the community was not enrolled in the flood insurance program, a grace period of six months following the date of the Federal Damage Survey Report is provided, during which the community must qualify and enroll. Assistance for a specific structure is allowed only if the owner insures it. By this mechanism the control over flood plain development required by the insurance program is almost certain to be put into effect. Incidentally, this condition for receiving aid in flood hazard areas applies regardless of the type of disaster (i.e., earthquake or fire) that occasioned the need for assistance. Since Northampton is already in the program, only uninsured properties are affected by the condition.

II. SURVEY INTERVIEWS

This chapter begins the discussion of attitudes toward flood management with a description of the two groups of respondents whose interviews were conducted on the basis of a formal questionnaire, and a description of the questionnaire itself. This is followed by a summary and analysis of the data gathered.

In the text and accompanying tables, the flood plain respondents are referred to as flood plain residents (N); the respondents who make up the random sample are referred to as Northampton residents (n).

A. Flood Plain Residents

The attitudes of flood plain residents were considered to be a very important part of this study because these people all have an immediate, personal stake in what government does or does not do about flood protection and flood plain regulation. Also, over time they develop an expertise about flooding in their particular location which is of a rather different kind than that of non-resident observers. For good or ill or both, the river is part of their milieu.

Five of the cases in this category are not residences but small businesses. They are referred to in the discussion and included in the statistical analysis as though they are residences. Reasons for combining the two groups are that these small businesses are all local in character. They are run by people who spend a substantial amount of their time in the flood plain and whose interest in flood plain issues appears to be closely analogous to that of residents. Identical questionnaires were used for both groups except for the few minor adjustments described below in section C of this chapter.

Addresses, and in most cases names, of flood plain landholders were supplied to the consultants by the New England Division of the Corps of Engineers. The information had been obtained in a 1976 survey of the area. All of the properties involved are located wholly or in part in the 100 year flood zone (as shown on the 1977 Flood Insurance Rate Map prepared by the Corps for the Department of Housing and Urban Development).

Attempts were made to interview an adult representative from all residences and small businesses in the 100 year flood zone--a total of 76 addresses. Of these addresses, four were separate apartments in two-family dwellings. Thus, 72 properties were involved. Interviews were completed at 53 addresses, 69.7% of the total number. Forty-nine were residences and 4 were small businesses. No contact was made at 5 addresses (6.6%). One of the 5 was a vacant apartment; another was an unused gasoline station which, from its appearance, had not been in

operation for a considerable length of time. Persons from an additional 18 addresses (23.7%, all residences) declined to participate in the survey. Reasons for refusing are shown in Table 16.

Table 16
Flood Plain Resident Interview Refusals by Type

Number	Reason
5	Not interested in participating
4	Too busy
2	Ill or illness in family
2	Survey is pointless, will not change anything
1	Suspicious of survey
1	Self-professed lack of knowledge and interest in flood plain matters
1	Too upset about issues
1	Already participated
1	Irrational or incompetent response to interviewer
18	TOTAL

Because of the importance attributed to this group of interviews, efforts to contact people and persuade them to participate went beyond what one would normally expect in a survey situation. Many telephone calls and personal visits were made. Because a substantial proportion of people in the area were known to be of Polish heritage, interviewers fluent in Polish as well as English were available whenever their language skill was useful. Firm promises of anonymity were made and kept. (The last applies to all persons who answered the questionnaire.)

One interviewer handled more than two-thirds of the contacts with this group and, in the process, became quite familiar with the area and many of its people. In her opinion, some residents were reluctant to be interviewed because they had recently and repeatedly been involved with flood plain issues and were unhappy with the way decisions seemed

to be going. A few people seemed to be too tired of the subject and too discouraged to want to talk about it. This response was noticed particularly in neighborhoods where expansion of nearby recreational facilities was thought likely. In these people's view, the result of expansion would be neighborhood degradation in the form of more noise, traffic, dust from unpaved roads, inconsiderate parking, littering and vandalism. The interviewer also noted resentment that better-off or more influential flood plain occupants might be allowed to further develop their property while they, the neighborhood people, would not. Whether or not these feelings were entirely justified, they did exist. Consequently, the number of interviews obtained may be slightly reduced by unfortunate timing of the interviewing process, a result that was not anticipated or intended.

The interviewing was done in 1978, from the last week in March through early July. The average time per interview was about 53 minutes.

B. The Random Sample

The attitudes of the general public of Northampton are important in this study because the public, to some extent at least, sets the boundaries of permissible government action at the local level. It is true that local governments are constrained--sometimes severely--by state and federal requirements. It is also true that many people of a community may not care much or even pay much attention to the performance of their local government, so long as necessary functions are carried out reasonably smoothly. However, what is known as "public opinion" appears to embody some outside parameters for what is acceptable in government behavior and to provide some guidance for officials who wish to help bring to fruition the desires, however amorphous and contradictory, of the public. A study of public opinion may also show a lack of understanding of some problems and issues which could suggest a need for educational and leadership efforts.

The ideal way to find out what people think about flood-related issues would be to ask each person. This would be extremely costly and time consuming. Possible alternatives include "man-in-the-street" interviews or a mail or newspaper questionnaire to be filled out and returned. However, these techniques offer no assurance that an unbiased representation of public opinion will be obtained. Another method that is moderate in cost yet reasonably accurate is to interview a random sample of the total population, contacting only enough people to produce results which are statistically significant. An opinion survey, properly done, should result in a selection of persons to interview that closely resembles the total population in demographic characteristics, including age, occupation, income, and ethnicity, and also in the range of their opinions and strengths of their beliefs. Random sampling is the standard, accepted technique used not only in the social sciences but in many other research contexts as well.

For this study, a random sample of households was drawn from Northampton's 1977 street list (the 1978 list not being in print yet). This publication names all--or as many as could be found--adult residents of the city and lists them alphabetically by street name and house number within each of the 14 precincts. A number was drawn at random, and the address and name appearing on the corresponding line of print on each page of the street list was used for the sample. Since this procedure did not produce a large enough sample, a second random number was drawn and names were taken in the same manner from every other page. The interviewers attempted to interview the specific person named. If an appointment could not be arranged or the person no longer lived at the specified address, another adult from the same address was interviewed.

The total sample consisted of individuals from 394 households. Of these, 215 or 54.6% of the total were actually interviewed. In 48 cases (12.2%) no contact was made with the household although at least three attempts were made. Of these 48 addresses, 5 appeared to be vacant. In 131 cases (33.2%), the person declined to be interviewed. Reasons for these refusals are categorized in Table 17. Interviewers tried to persuade these people to participate by saying that they would not be bothered again, they did not have to have any special knowledge, their opinions were important, nothing was being sold, their names would not be revealed, or whatever was appropriate (and true) in the particular circumstances. While a higher percentage of completed interviews would have been preferred, the actual percentage is within the range normally considered acceptable for surveys of this type.

Most interviews were arranged for by appointments made over the telephone. However, a substantial number resulted from visits to homes. The interviewing period extended from the last week in March, 1978, through the first week of July, 1978, with the bulk of the work done in April and May. The average time per interview was about 40 minutes.

C. The Questionnaire

1. General Comments

A single questionnaire* was used for interviews with the random sample of Northampton's population and with flood plain residents, including the businesses mentioned previously. Some questions were asked of flood plain residents only, and a few minor adjustments in language were necessary to make the questionnaire applicable to businesses as opposed to households. These modifications are explained below as they occur in the questionnaire.

*A copy of the questionnaire appears in Appendix B, pp. 153-168.

Table 17

Random Sample Interview Refusals by Type

Number	Reason
40	Not interested
27	Too busy
20	Illness (self or family) or old age
11	Do not want to participate
9	Do not want to be bothered (hostile)
7	Appointment(s) made but respondent was not there
5	Hostile or upset about government, taxes
4	Mistrustful, suspect sales pitch
3	Language barrier (French, German, one unknown)
3	Irrational or incompetent response to interviewer
2	Self-professed ignorance of subject matter
131	TOTAL

The five groups of questions relate to personal experience with floods, perception of flood hazard, attitudes toward flood management alternatives, participation in public affairs, and personal history. Responses were recorded in predetermined answer categories in a form permitting statistical analysis to be performed. Nearly all questions could be answered "yes" or "no" or within a format permitting scaling from 1 to 4. For example, an answer indicating strong agreement with an idea was given the value 1; an answer indicating strong disagreement was given the value 4; and weaker levels of agreement or disagreement were given the values 2 or 3 respectively. The values obtained from all respondents or from specific groups of them could be averaged,

producing an indication of direction and strength of opinion of the population or group as a whole. Thus, an average (mean) of 1.2 would signify very strong agreement, while an average of 3.1 would signify moderate disagreement. The advantages of an even number scale are that respondents are forced to choose an opinion since a neutral response is not available, and the opinions of different groups of people can be compared.

A "don't know" answer was available for occasions when a respondent did not know the answer to a question, did not understand it, or could not make up his/her mind which answer to choose. Interviewers were instructed to encourage (without being pushy) responses which conform to the scale, since "don't know," multiple, and highly qualified responses cannot be used in computing mean values and associated statistics. In fact, the scaled answers were read to the respondents but "don't know" was not; it had to be offered by the respondent.

The questionnaire was printed with ample clear space so that interviewers could write down supplementary comments as they were made.

2. Personal Experience with Floods

The first eight questions dealt with the kinds of experiences that people have had with floods, particularly in the Northampton area. The purpose was to find out if this personal history had a significant relationship to attitudes toward flood management alternatives. Also, it was hoped that starting the interview with a personal but not really confidential topic would help establish interest and a good rapport between interviewer and respondent.

People were first asked if they had ever lived in a place where there was a flood and, if so, if this was in the Northampton area. If either answer was "no," the interviewer skipped directly to the next group of questions. If the answers to both questions were "yes," respondents were asked to name the years (or an estimate) in which they had experienced floods, and to state the year of the worst flood. The year of the most recent flood mentioned was also noted. Since the flood history of the major rivers in Northampton is known, it is possible to get some idea of the magnitude of event that people meant when they talked about floods. Respondents were then asked whether or not they or their family had suffered any property losses (i.e., home or car), personal injury, or financial losses (lost income, commercial crop damage, etc.). This information was taken as an indicator of the intensity of flood experiences.

3. Perception of Flood Hazard

Six questions concerned respondents' opinions about past flood damage in Northampton and future flood hazard for the city. Respondents were asked to evaluate the seriousness of previous floods. The scaled answer categories were "very serious," "somewhat serious," "not too serious," and "not serious at all." The next question called for identifying which one of four named classes of flood victims had been most severely affected by past floods: flood plain residents, flood plain businesses, local merchants, or public services and utilities. Another question asked for an evaluation of the seriousness of potential flood damage, using the same answers as for past floods. Each respondent then named the single area of Northampton he thought would be most threatened by floods. The response was recorded and then classified as being in the flood plain of either the Connecticut River or Mill River.

The next two questions examined the respondent's understanding of the probability of serious floods occurring. First, he was asked to place on a scale of 0% to 100% the chance that Northampton would experience a serious flood within the next ten years. Then he was asked, based on the supposition that a serious flood took place in the city this year, how soon he would expect the next flood to occur. The choice of answers provided was:

SOON - since floods seem to happen in groups.

NOT FOR A WHILE - since floods occur according to a regular cycle.

CAN'T TELL - since floods can happen in any year.

THERE WON'T BE ANOTHER flood - because this area is already well protected.

Capitalized phrases were used as reminders of the available answers.

All of the questions in this section asked for opinions, but the answers also depended partly on knowledge of local flood history and a theoretical perspective on the predictability of floods. Thus, some insight is gained as to how realistically people are thinking about flood risks.

4. Attitudes toward Flood Management Alternatives

This series of thirty-eight questions was of prime importance in the survey portion of the study. Answers to the other questions may be interesting in themselves, but their most important purpose is to provide a foundation for interpreting the data from this section. These questions deal with attitudes toward nine approaches to flood control and/or mitigation of the undesired consequences of flooding. Two of the approaches are structural and seven are non-structural.

For most of the nine alternatives, respondents were first asked simply if they knew about it or had heard about it ("yes" or "no"). Then a very brief description of the alternative was given (in some cases with the assistance of simple graphics*) and the respondents were asked again if they knew about it. These two questions permitted a gross measure of knowledgeableness which was used to evaluate responses to the ensuing questions related to the alternative. The respondent was asked whether he was strongly in favor, somewhat in favor, somewhat opposed, or strongly opposed to use of the alternative. He was also asked to evaluate the effectiveness of the alternative in terms of preventing or alleviating flood damage (very effective, somewhat effective, not too effective or very ineffective). The distinction between favorableness and effectiveness was made because it is logically possible not to favor something even though it would be effective, and it is also possible to favor something even though it would be ineffective. Thus, the single question "Should this alternative be used?" would not necessarily result in an answer that clearly expressed an attitude toward the alternative.

The nine alternatives are listed below along with the brief explanations given to respondents. Exceptions to the pattern of questioning just described are also noted.

1) Dams. First it was explained that one approach to controlling floods is through the construction of large structures such as dams and dikes, and that dams are used to hold flood waters upstream so that downstream areas are protected. A graphic representation of a dam was shown. The respondent was then asked if he knew if dams are used to control floods in the Northampton area.

2) Dikes. Explanation: "Dikes are another kind of structure used to control floods. They are built along the river banks and allow flood waters to flow downstream, but confine them in the main river channel." Graphic representations of a dike, river channel and flood plain were shown. Then the respondent was asked if he knew whether dikes are used to control flooding in Northampton.

3) Flood plain zoning. Explanation: "Flood plain zoning laws are enacted by some towns for the purpose of regulating the use of land and structures in order to reduce flood damage potential. These regulations may be used to restrict construction on the flood plain which is likely to be damaged by floods." The explanation was accompanied by graphics.

4) Flood proofing. Explanation: "Buildings are flood proofed through structural modifications such as raising foundations above the flood plain, fitting watertight doors, or installing special window shields." Drawings of examples were shown.

*The graphics are reproduced in Appendix B, pp. 169-172.

5) Flood insurance. Explanation: "The idea behind the [flood insurance] program is that the federal government will subsidize flood insurance for property owners in flood areas if, in return, local communities agree to establish policies which place restrictions on further construction or development in those areas. Also, new construction in flood-prone areas has to include certain flood proofing measures. The purpose of the program is to reduce future flood damage."

6) Outright purchase (including the possibility of relocating homes or businesses). Explanation: "The idea is very simple. If the government purchased at a fair price property which might be severely damaged by a flood, people could then afford to move off the flood plain. Once the government had helped people move, the buildings could be taken down and the land put to some use which would not be so susceptible to expensive flood damage--maybe a park or for agriculture." An extra question not included in the series for other alternatives was then asked: "If the government is willing to pay a fair market price for property on the flood plain, and to pay the expenses for moving the people who live there, do you think it is right for people to be required to sell their property and move?" Flood plain residents were also asked this question: "If the government offered you a fair market price for what you own on the flood plain, and paid your moving expenses, would you be willing to sell?" In addition to "yes," "no," and "don't know," the questionnaire form included the category "depends (specify)." This was used for strongly conditional answers, and the interviewer noted the particular condition.

7) Partial purchase. The respondent was asked in separate questions whether he had heard of transferring development rights and whether he had heard of conservation easements. Then this explanation was given: "For land which is not highly developed, the owner can sell just the right to develop the land. In this way, restrictions may be placed on the types of future development or uses of the land which might affect flood levels, but the owner of the land still retains all the other rights associated with ownership. For example, he could go right on living or farming there just as he had been."

8) Flood warning and evacuation. Explanation: "The government monitors rain intensity and river flow in order to provide warning when potential flood conditions might occur. If a flood seems imminent, state and local organizations can issue warnings and provide assistance so that residents can move themselves and some of their belongings away from flood danger. Emergency centers are also provided for people who have been flooded out."

9) Flood disaster relief. Explanation: "After a very serious flood which damages a lot of property and may injure many people, the government may declare the area to be a 'disaster.' This official declaration qualifies the area for special disaster relief such as emergency food, medical aid, temporary shelter and additional manpower to help get things back to normal again. In addition, people who have lost

property may be eligible for special financial assistance such as low interest loans."

The final question in this section confronted the respondent with five generalized approaches to flood management. The question was presented as follows:

We have talked about a lot of different ways to reduce flood damage. All of these ways potentially affect people's property rights in one way or another. On the whole, if you had to decide, which of these five approaches would you choose for the Northampton area?

1. Keep things as they are and not provide any additional protection measures or controls except for providing flood warnings, evacuation assistance, and disaster relief.
2. Build more dams and dikes even though it may mean requiring owners in communities other than Northampton to sell their property or affect them in other ways.
3. Use measures such as flood plain zoning and flood insurance or transfer of development rights which restrict the owners' use of property on the flood plain but do not require them to sell and move away.
4. Provide programs which offer financial incentives or assistance to flood plain landowners to voluntarily flood proof buildings, maintain open space areas, or give up some rights to develop their land.
5. Purchase property in the Northampton area which is on the flood plain, even if owners must be required to sell and relocate their residences or businesses (with government assistance, of course).

The first answer is essentially a status quo choice. The second implies reliance solely on flood control structures. The last three involve non-structural measures, with each choice involving a different magnitude of government control over private use of private land. Answer 3 calls for medium government control, answer 4 is least restrictive, and answer 5 is the most authoritarian choice given. It was desired that respondents make their choice in light of a broad range of consequences. Therefore, some of these were mentioned in the answers. Interviewers were instructed to encourage a substantive answer rather than "don't know" for this question especially.

It should be noted that, to the extent they were able to, interviewers freely answered any questions that came up about the alternatives.

5. Participation in Public Affairs

Five questions were used to find out whether respondents seemed to have an interest in public affairs and were active participants. The purpose was to get some indication of the likelihood that their attitudes toward flood management might be expressed in behavior. Respondents were asked how frequently they voted in national elections and in local elections. The scale for frequency was every election, most elections, some elections, or none or hardly any. A separate answer category for people not eligible to vote was available.

The next question was: "In addition to voting, some people express their concerns for how the community should be run by actively participating in civic clubs (such as Rotary or League of Women Voters), special interest groups (such as labor unions, PTA or Audubon) or other public spirited organizations. Do you try to influence the way things are done around here by participating in such organizations by being a member, officer or giving financial support--very often, sometimes, occasionally or hardly ever?"

Another question asked whether the respondent was aware of a public meeting held to discuss some issue important to the area during the past year or so. If the answer was "yes," the kind(s) of meeting(s) mentioned was recorded. Frequency of attendance at such meetings was recorded as almost always, often, occasionally, or rarely.

6. Personal Characteristics

The final group of questions related to the person's own characteristics and living circumstances. The number of people in the household was asked. (Operators of small flood plain businesses were asked the number of employees usually working at the site.) Respondents were then asked if they owned land or buildings on a river's flood plain and, if so, what kind of property it is (house, business, farm buildings, or land). They were also asked if they had flood insurance on the property. Further questions covered schooling completed, occupation, year of birth, years lived around Northampton, and years lived in the present house (or years the person had his flood plain business at that location).

Flood plain residents were asked if they owned the building where they were interviewed (home or business), if the building used city water and was on a city sewer line, if they knew of any flood proofing that had been done for the building, if they had spent any of their own money to protect their property from future flood damage, and if they had been aware of possible flood problems when they first moved there. For flood plain interviews only, the interviewer noted whether the respondent was primarily a resident, farmer, or business person.

Answers to the questions in this group provided data which it was thought might be valuable in interpreting the attitudinal information.

D. Data Analysis*

1. Flood Experience

The survey results in Table 18 show that residents of the flood plain are much more likely than residents of Northampton as a whole to have experienced a flood. However, it seems fairly remarkable that a full third of Northampton's adult population has experienced a flood at some time or place during their lives. Table 18 also shows that nearly all flood plain residents who have experienced a flood had the experience in Northampton, while this is true for only half of the Northampton sample who have experienced a flood. Therefore, almost every person living on the flood plain has had some direct experience with flooding in Northampton. On the other hand, personal experience with flooding seems fairly extensive among the general population, but it is just as likely to have been gained away from as in the Northampton area.

Among respondents who have experienced a flood, Table 19 indicates that there is general agreement that the floods of 1936 and 1938 were the worst. However, the flood plain resident's last experience with flooding is apt to be more recent than for the population as a whole. Although experience may increase the public's sensitivity to an event, one would expect that it would fade with time. This may be the case for the residents of Northampton where less than 2% of the total population has experienced a flood since the 1950's.

Another approach to assessing the comparative experiences of flood victims is to investigate the losses which they have suffered. As shown in Table 20, flood plain residents who have experienced a flood are much more likely than Northampton residents to have lost property (or to remember having lost property) due to flooding. Flood plain residents are also more likely than Northampton residents to have suffered financial loss from a flood. However, personal injury or injuries to one's family are equally rare for both groups.

*Levels of significance of the statistics have been standardized throughout the report. They are indicated by the following symbols:

- *** Probability < .001 Very highly significant
- ** Probability < .01 Highly significant
- * Probability ≤ .05 Significant
- n.s. Probability > .05 Not significant

In the tables, percents do not always total 100 because of rounding. The number of cases reported does not include responses recorded in the "don't know" category, resulting in differing N's and n's in the tables.

Table 18
Comparison of the Flood Experience of Flood Plain
and Northampton Residents

A. HAVE YOU EVER LIVED IN A PLACE WHERE THERE WAS A FLOOD?

Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Yes	42	79.2	69	32.1
No	<u>11</u>	<u>20.8</u>	<u>146</u>	<u>67.9</u>
Total	53	100.0	215	100.0

Note: Chi squared = 37.04202*** Degrees of freedom = 1
Contingency coefficient = .35627

B. WAS THIS IN THE NORTHAMPTON AREA?

Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Yes	40	93.0	41	59.4
No	<u>3</u>	<u>7.0</u>	<u>28</u>	<u>40.6</u>
Total	43	100.0	69	100.0

Note: Chi squared = 13.31168*** Degrees of freedom = 1
Contingency coefficient = .34310

Table 19

Comparison of the Worst and Most Recently
Experienced Floods for Flood Plain
and Northampton Residents

A. YEAR IN DECADES OF WORST FLOOD MENTIONED

Decade	Flood Plain Residents		Northampton Residents	
	N	%	n	%
1920's	1	2.5	0	0.0
1930's	26	65.0	22	55.0
1950's	7	17.5	16	40.0
1960's	3	7.5	1	2.5
1970's	<u>3</u>	<u>7.5</u>	<u>1</u>	<u>2.5</u>
Total	40	100.0	40	100.0

Note: Chi squared = 6.85507^{n.s.} Degrees of freedom = 4
Contingency coefficient = .28094

B. YEAR IN DECADES OF MOST RECENTLY EXPERIENCED FLOOD

Decade	Flood Plain Residents		Northampton Residents	
	N	%	n	%
1930's	5	12.5	12	29.3
1950's	16	40.0	23	56.1
1960's	9	22.5	2	4.9
1970's	<u>10</u>	<u>25.0</u>	<u>4</u>	<u>9.8</u>
Total	40	100.0	41	100.1

Note: Chi squared = 11.15409* Degrees of freedom = 3
Contingency coefficient = .34790

Table 20

Comparison of Flood Damages Suffered by Flood Plain
and Northampton Residents Who Have
Lived Through a Flood

A. LOSS OF PROPERTY, SELF OR FAMILY

Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Yes	26	60.5	21	30.9
No	<u>17</u>	<u>39.5</u>	<u>47</u>	<u>69.1</u>
Total	43	100.0	68	100.0

Note: Chi squared = 8.26992** Degrees of freedom = 1
Contingency coefficient = .28000

B. PERSONAL INJURY TO SELF OR FAMILY

Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Yes	1	2.3	1	1.5
No	<u>42</u>	<u>97.7</u>	<u>67</u>	<u>98.5</u>
Total	43	100.0	68	100.0

Note: Chi squared = .16199^{n.s.} Degrees of freedom = 1
Contingency coefficient = .03130

C. FINANCIAL LOSS, SELF OR FAMILY

Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Yes	21	48.8	14	21.5
No	<u>22</u>	<u>51.2</u>	<u>51</u>	<u>78.5</u>
Total	43	100.0	65	100.0

Note: Chi squared = 7.60227** Degrees of freedom = 1
Contingency coefficient = .27455

2. Perception of Flood Hazard

Respondents were asked to evaluate how serious a problem flooding has been for the Northampton area in the past. A rating of 1 was assigned for "very serious," 4 for "not serious at all," and 2 and 3 for intermediate responses. The results for the two respondent groups are given in Table 21. Both the flood plain and Northampton sample groups perceive flooding as a somewhat serious problem and there seems to be little difference between their evaluations. However, the flood plain residents perceive a significantly greater present flood hazard than do the Northampton residents. This conclusion is corroborated by two measures, one using a four-point rating scale and the other asking for the percent probability of a flood occurring in the Northampton area during the next ten years. The correlations between these two measures are relatively strong (.663 for flood plain residents and .443 for Northampton residents) and they are statistically significant. It is interesting to note that all the ratings of present flood hazard are on the serious side of moderate, yet the average judged probability of a flood occurring during the next ten years is less than 50% for both groups. While the precise implication of this contrast is not clear, it may indicate that floods are perceived as such serious events that even one or two incidents of flooding during a lifetime are perceived as serious.

Table 21

Comparison of Perceptions of Flood Risks of
Flood Plain and Northampton Residents

Subject	Level of Signifi- cance	Flood Plain Mean	Northampton		
			Mean	Standard Deviation	95% Confidence Interval
Past danger	n.s.	2.08	2.09 ^b	.07	1.96- 2.22
Present danger ^a	***	2.16	2.60 ^b	.05	2.51- 2.69
Probability of flood during next 10 years	***	44.79	32.28	1.71	28.93-35.64

^aThe correlation (Pearsonian r) between present danger and probability of flooding is .663 for the flood plain residents and .443 for the Northampton residents.

^bThe means for past and present flood danger are significantly different for the Northampton sample ($t = 3.13^{**}$, degrees of freedom = 200).

Another comparison shows that present flood danger is perceived as less serious than past flood danger by both groups. This separation is not so distinct for the flood plain residents (2.16 versus 2.08 respectively) as for the Northampton sample (2.60 versus 2.09 respectively). Since the Northampton means are from a sample, they are amenable to a t test which indicates a significant difference between the two means ($t = 3.13^{**}$, degrees of freedom = 200).

Whereas respondents generally accept the inevitability of a serious flood occurring in the Northampton area, they make no pretense of being able to predict when it might occur. When asked when the next serious flood would occur if one had occurred this year, the majority of flood plain (69.2%) and Northampton (75.5%) respondents answered that they could not tell, since floods can happen in any year. In this regard, there seems to be no significant difference between the two groups ($\chi^2 = 5.00$, degrees of freedom = 3). Respondents overwhelmingly agreed that the Connecticut River flood plain is the most threatened area in Northampton; 88.5% for the flood plain and 94.8% for the Northampton respondents as shown in Table 23. A similarly strong pattern of agreement exists in Table 24 as to who suffers most during floods; two-thirds of both groups responded that flood plain residents suffer most; one-fourth of both groups responded that flood plain businesses suffered most.

Table 22

Comparison of Flood Plain and Northampton
Residents' Judgments as to When to
Expect the Next Flood

IF THERE HAD BEEN A SERIOUS FLOOD THIS YEAR, WHEN WOULD YOU EXPECT THE NEXT ONE TO OCCUR?				
Response	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Soon	5	9.6	6	2.8
Not for a while	6	11.5	22	10.4
Can't tell	36	69.2	160	75.5
Won't be another	<u>5</u>	<u>9.6</u>	<u>24</u>	<u>11.3</u>
Total	52	99.9	212	100.0

Note: Chi squared = 4.99664^{n.s.} Degrees of freedom = 3
Contingency coefficient = .13629

Table 23

Comparison of Flood Plain and Northampton
Residents' Judgments as to the Most
Threatened Area of Northampton

Area	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Connecticut River	46	88.5	199	94.6
Mill River	<u>6</u>	<u>11.5</u>	<u>11</u>	<u>5.2</u>
Total	53	100.0	210	99.8

Note: Chi squared = 1.78720^{n.s.} Degrees of freedom = 1
Contingency coefficient = .10149

Table 24

Comparison of Flood Plain and Northampton
Residents' Judgments as to Who Suffers
Most from Floods

Type of Victims	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Flood Plain Residents	34	69.4	138	67.6
Flood Plain Businesses	13	26.5	49	24.0
Local Merchants	1	2.0	2	1.0
Public Services	<u>1</u>	<u>2.0</u>	<u>15</u>	<u>7.4</u>
Total	49	99.9	204	100.0

Note: Chi squared = 2.25691^{n.s.} Degrees of freedom = 3
Contingency coefficient = .09403

Each respondent was asked two times whether he/she was aware of each of nine flood hazard control measures. First, respondents were asked directly whether or not they knew about a particular measure. For example: "Some people have protected their buildings by flood proofing them. Have you ever heard of this?" The follow-up question was asked after the respondent had been given an explanation of the method's use or effects. For example: "Buildings are flood proofed through structural modifications such as raising foundations above the flood plain, fitting watertight doors, or installing special window shields. Have you ever heard discussions of any measures like these?" The response patterns to these questions are shown in Table 25 for flood plain residents and in Table 26 for Northampton residents. These tables report the cell frequencies in 2 x 2 contingency matrices. The first cell contains the number of persons who answered yes to both the 'direct' and 'illustrated' versions of a knowledge question; these people were obviously aware of the method in question. The second cell contains the number of persons who thought they were aware of the method when answering the 'direct' question but changed their minds when 'illustrations' were used in the second form of the question. High numbers are disturbing in this cell, because the numbers indicate persons who claim knowledge at the general level but are unaware of even common examples. The third cell contains the number of people who thought they were unaware of the method until provided with the explanation before the second question was asked. The last cell contains the number of persons who were completely unaware of the method. The strengths of the relationship between these two forms of question are measured using phi, a correlation-type measure which has a value between 0 and 1. The more perfectly related responses to the two questions are (that is, the larger the proportion of people answering both questions the same way), the closer the value approaches 1. The level of significance for phi is shared with the chi squared from which it is calculated.

Only the illustrated form of the question was asked for the two structural alternatives--dams and dikes. The flood plain population is very aware that dikes are used to control flooding in the Northampton area. However, a surprisingly large percentage (20%) do not think of dams being used to protect the same area. An explanation suggested by one of the Polish-speaking interviewers was that dams are too remote to be perceived as offering protection. Her opinion, based on knowledge of the local culture, is that flood protection, to be perceived as existing, would have to be visible and nearby. A similar incognizance exists among the Northampton sample where 47% of the respondents were not aware that dams contributed to flood control in the Northampton area.

Among the answers to questions regarding non-structural alternatives, the most disturbing responses appear in the second column--"yes" to a direct question but "no" when given illustrations. Among flood plain respondents, only the availability of flood insurance seems to be

Table 25

Prior Awareness of Flood Hazard Control Measures: Flood Plain Residents

Measure	Response Frequencies and Percents ^a								N	phi
	Yes-Yes		Yes-No		No-Yes		No-No			
	N	%	N	%	N	%	N	%		
Dams	36	80.0	--	--	--	--	9	20.0	45	--
Dikes	49	96.1	--	--	--	--	2	3.9	51	--
Zoning	38	71.7	0	0	3	5.7	12	22.6	53	.861***
Flood Proofing	20	39.2	1	2.0	5	9.8	25	49.0	51	.774***
Flood Insurance	32	61.5	11	21.2	3	5.9	6	11.5	52	.331*
Public Purchase	19	36.5	2	3.8	7	13.5	24	46.2	52	.666***
Conservation Easements	17	33.3	4	7.8	4	7.8	26	51.0	51	.676***
Transfer of Develop- ment Rights	11	21.6	2	3.8	10	19.2	29	55.8	52	.521***
Flood Warning	38	73.1	2	3.8	6	11.5	6	11.5	52	.526***
Disaster Assistance	36	69.2	0	0	10	19.2	6	11.5	52	.542***

^aThe first response listed is to the 'direct' form of the question; the second response is to the 'illustrated' form.

Table 26

Prior Awareness of Flood Hazard Control Measures: Northampton Residents

Measure	Response Frequencies and Percents ^a								n	phi
	Yes-Yes		Yes-No		No-Yes		No-No			
	n	%	n	%	n	%	n	%		
Dams	94	53.1	--	--	--	--	83	46.9	177	--
Dikes	176	89.1	--	--	--	--	20	10.2	196	--
Zoning	109	51.2	19	8.9	13	6.1	72	33.8	213	.691***
Flood Proofing	50	23.6	11	5.2	23	10.8	128	60.4	212	.636***
Flood Insurance	90	42.9	28	13.3	10	4.8	82	39.0	210	.650***
Public Purchase	32	15.0	6	2.8	20	9.4	155	72.8	213	.649***
Conservation Easements	46	22.1	31	14.9	17	8.2	114	54.8	208	.491***
Transfer of Development Rights	29	13.9	12	5.7	34	16.3	134	64.1	209	.437***
Flood Warning	157	73.4	2	.9	28	13.1	27	12.6	214	.611***
Disaster Assistance	186	87.7	1	.5	15	7.1	10	4.7	212	.574***

^aThe first response listed is to the 'direct' form of the question; the second response is to the 'illustrated' form.

confused in this manner. One would expect this confusion to stem from unfamiliarity with a complex federal program in contrast to the more familiar idea of ordinary commercial insurance. This same pattern of unawareness occurred among Northampton's residents, suggesting a potential need for better and broader public education concerning flood insurance and government subsidies. The Northampton sample also had a fairly high rate of confusion about easements used for conservation measures. Among both groups the possibility of using public purchase of full or partial rights seems to be an unfamiliar concept. The non-structural flood hazard control methods which seem to be best known among both groups are flood plain zoning, disaster relief, and advance flood warning.

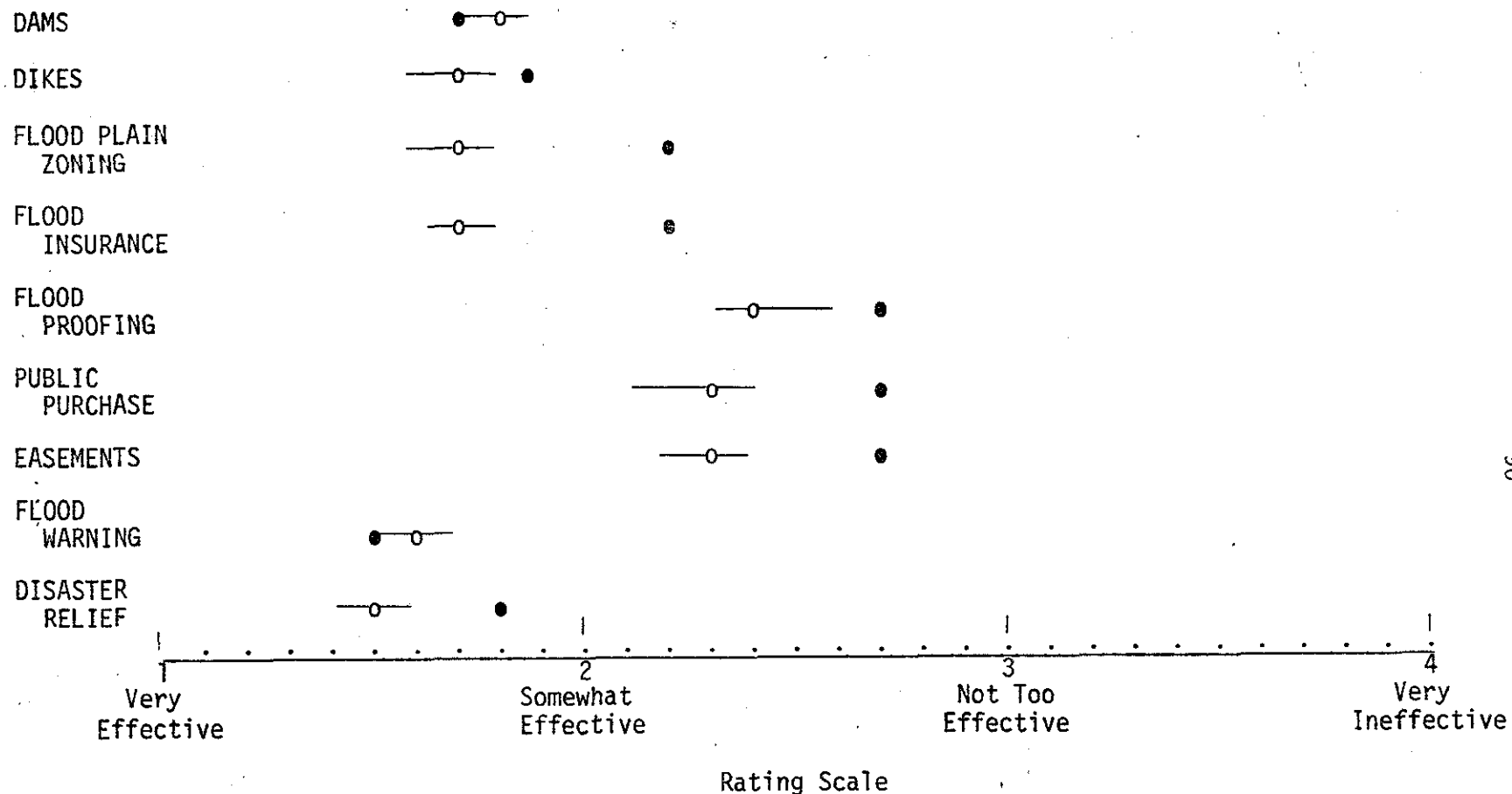
These data may be summarized by means of an index which measures the proportion of flood hazard control measures about which each respondent has knowledge. (The general form of the flood insurance question was not used, since it seemed to refer to a form of common insurance which does not normally exist.) On the average, respondents in the Northampton sample are aware of 5.1 out of a possible 9.0 methods, while the flood plain residents are aware of an average of 6.4 methods. The index shows that flood plain residents are more aware of these methods than are Northampton residents, and that the difference is very highly significant. (Flood plain mean = .712; Northampton mean = .577; 99.9% confidence interval is .548-.606; probability < .001.)

3. Attitudes Toward Flood Management Alternatives

Both groups of respondents were asked their opinions as to whether or not each of the methods to control flood hazard is effective and if it should be used. The results for effectiveness are summarized for both groups in Figure 8 and Table 27. Results concerning approval appear in Figure 9 and Table 28. Overall, the opinions are positive toward the alternatives. However, the flood plain residents' responses were significantly different from the general sample of Northampton on most points.

1) Dams. There is no significant difference between the groups' estimations about how well dams work in reducing flood hazard. The choice is the second most preferred by flood plain respondents, falling behind only flood warning and evacuation. It fared less well among the Northampton sample which gave dams a moderate mean rating when ranked with other methods. The two groups disagree on whether dams should actually be used to protect the Northampton area. Flood plain respondents are more positively disposed toward the idea, although it is ranked moderately among their judgments. However, among the general public, only the use of public purchase fares worse; the ratings for flood

HOW WELL DO YOU THINK [ALTERNATIVE] WOULD WORK IN THE NORTHAMPTON AREA AS A WAY TO REDUCE FUTURE FLOOD DAMAGE?



Note: ● mean rating by flood plain respondents.
 o mean rating by Northampton respondents.
 — 95% confidence interval of mean ratings for Northampton respondents.
 If ● is outside the 95% confidence interval line, there is 95% certainty that the two means are different.

Fig. 8. Summary comparison of flood plain and Northampton residents' opinions as to the effectiveness of flood hazard control alternatives.

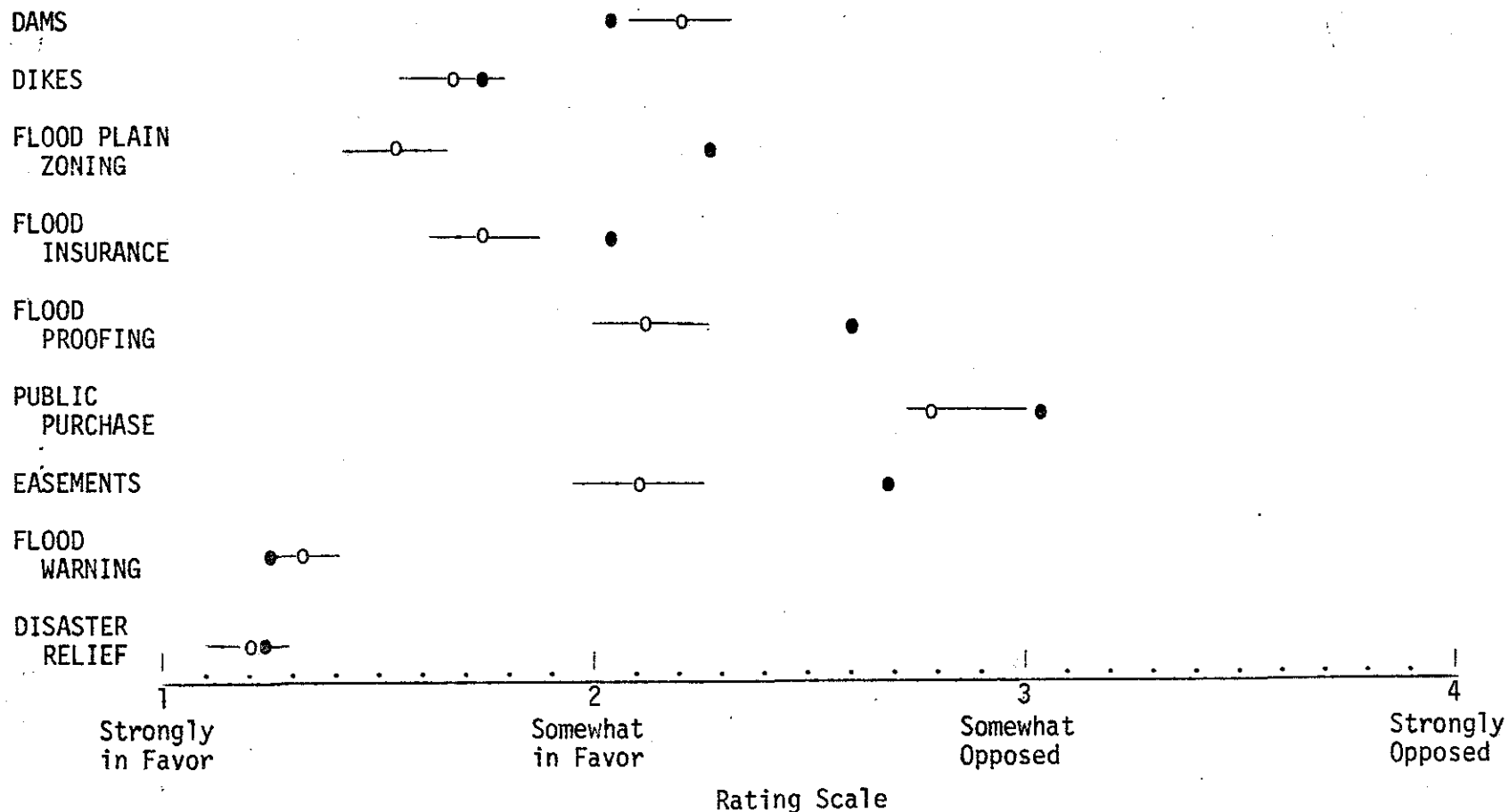
Table 27

Comparison of Flood Plain and Northampton Residents' Opinions
as to the Effectiveness of Flood Hazard Control Alternatives

HOW WELL DO YOU THINK [ALTERNATIVE] WOULD WORK IN THE NORTHAMPTON AREA AS A WAY TO REDUCE FUTURE FLOOD DAMAGE?					
Alternative	Significance	Flood Plain Residents	Northampton Residents		95% Confidence Interval
		Mean	Mean	Standard Deviation	
Dams	n.s.	1.72	1.79	.72	1.69-1.89
Dikes	***	1.86	1.66	.64	1.57-1.75
Flood Plain Zoning	***	2.16	1.66	.80	1.55-1.76
Flood Insurance	***	2.23	1.73	.76	1.62-1.84
Flood Proofing	**	2.69	2.43	.98	2.29-2.57
Public Purchase	***	2.71	2.25	1.01	2.11-2.38
Easements	***	2.66	2.27	.89	2.15-2.40
Flood Warning	n.s.	1.49	1.57	.72	1.47-1.67
Disaster Relief	***	1.78	1.51	.64	1.42-1.60

Note: Means approaching 1 indicate strong belief in effectiveness; means approaching 4 indicate strong belief in ineffectiveness.

WHAT IS YOUR PERSONAL OPINION ABOUT USING [ALTERNATIVE] IN THE NORTHAMPTON AREA AS A WAY TO LESSEN FLOOD DAMAGE?



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Note: ● mean rating by flood plain respondents.

o mean rating by Northampton respondents.

— 95% confidence interval of mean ratings for Northampton respondents.

If ● is outside the 95% confidence interval line, there is 95% certainty that the two means are different.

Fig. 9. Summary comparison of flood plain and Northampton Residents' approval of flood hazard control alternatives.

Table 28

Comparison of Flood Plain and Northampton Residents' Approval
of the Use of Flood Hazard Control Alternatives

WHAT IS YOUR PERSONAL OPINION ABOUT USING [ALTERNATIVE] IN THE NORTHAMPTON AREA AS A WAY TO LESSEN FLOOD DAMAGE?

Alternative	Significance	Flood Plain Residents	Northampton Residents		95% Confidence Interval
		Mean	Mean	Standard Deviation	
Dams	**	2.00	2.19	.92	2.07-2.32
Dikes	n.s.	1.73	1.67	.65	1.58-1.76
Flood Plain Zoning	***	2.28	1.56	.78	1.45-1.66
Flood Insurance	***	2.02	1.73	.88	1.61-1.85
Flood Proofing	***	2.62	2.12	.94	2.00-2.26
Public Purchase	**	3.04	2.82	.98	2.69-2.96
Easements	***	2.67	2.10	.94	1.97-2.23
Flood Warning	n.s.	1.27	1.32	.61	1.24-1.40
Disaster Relief	n.s.	1.24	1.20	.50	1.14-1.27

Note: Means approaching 1 indicate strong approval; means approaching 4 indicate strong disapproval.

proofing and easements are not significantly different from those for dams. This contrast between the ratings of a method that is apparently quite workable and still judged less appropriate than most other methods for actual use must be explained by some other criteria.

2) Dikes. The Northampton respondents have a significantly more positive expectation of how well dikes work to protect the area from flood hazards than do flood plain residents. Among the flood plain respondents, there seems to be less confidence in dikes than in dams. However, there is no significant difference between the groups about whether dikes should be used. It is fairly clear from these data that dikes are the preferred structural method.

3) Flood plain zoning. Flood plain respondents are significantly more critical of flood plain zoning than the Northampton respondents. Among the Northampton sample, the method received a high ranking for both effectiveness and desirability, being surpassed only by those methods which involve the least governmental control--flood warning and disaster relief. It is suggested that this highly positive ranking could be more related to the general acceptability of zoning as a land use control method than to flood plain zoning as a specific method to lessen flood hazards. While flood plain residents are generally not very impressed with how well flood plain zoning works, they are even less inclined to approve using zoning as a method to control flood hazards. A possible factor in this low approval rate may be awareness by flood plain respondents that their use of their own property could be affected.

4) Flood insurance. Flood plain residents are also significantly more critical of the federal flood insurance program than are the general Northampton respondents. The Northampton sample views flood insurance as a less favorable alternative for flood hazard abatement than zoning. It was clear in the question that participation in the federal flood insurance program is only possible when a community controls flood plain development through some means such as zoning. Therefore, it may be assumed that Northampton respondents probably do not see any additional benefit from a federal contribution to land use control. On the other hand, flood plain respondents are more favorably disposed to the insurance program than to zoning per se. This may be because the federal program can offer flood plain residents something in return for regulating the use of their property.

5) Flood proofing. The Northampton respondents were significantly more positive in their evaluation of flood proofing than the flood plain respondents. However, flood proofing is still the least effective method in the opinion of the Northampton sample. Both groups are more favorably disposed to using flood proofing than the method's ratings of effectiveness would suggest.

6) Public purchase. Public purchase of flood plain lands received highly negative evaluations from both groups; the flood plain respondents were significantly more critical of the prospect than

Northampton residents. In general, public purchase was an unacceptable alternative to both groups. When asked if they thought land-owners should be required to sell their property to the government if the price was fair, 68% of the Northampton sample answered "no," while only 28% responded "yes." The flood plain respondents found this alternative even less tolerable; 77% said "no." In addition, flood plain respondents were asked whether they would sell their property to the government if offered a fair price. Only 16% responded negatively, while 40% said "yes" and 44% said that "it would depend." Both groups were unfavorably disposed to the possibility of being required to sell their property to the government, but most of the flood plain respondents would sell if offered a fair price and other conditions were met. A frequently mentioned reservation was that the price might not be fair from the property owner's point of view.

7) Easements. The response pattern regarding the purchase of partial property rights through easements or transfer of development rights (TDR) is similar to, though more favorable than, the response pattern concerning the outright purchase of all property rights. Flood plain respondents were more critical of easements than were respondents in the Northampton sample. While the flood plain respondents rate effectiveness and desirability of easement purchase or TDR about the same, the Northampton sample rates desirability higher than effectiveness.

8) Flood warning and evacuation. There are no significant differences among the two groups' evaluation of flood warning. Both groups rank it as a most effective method in preventing flood damages. Both also have a higher regard for its use than they have for its effectiveness.

9) Disaster relief. The response pattern for disaster relief is similar to flood warning; however, flood plain respondents are significantly more skeptical of how well the method works.

In summary, the flood plain respondents were more critical in their evaluations of the various methods for controlling flood hazard. They not only have more experience with flooding but also live in the area where potential flooding would occur. Therefore, one would expect more discriminating evaluations from them. For the same reasons, flood plain respondents generally rated the desirability of using a method lower than they rated its effectiveness. Their experience may suggest to them that floods will occur, and cause damage no matter which efforts toward protection are made. If this is indeed the case, their general reluctance to accept limitations on the use of their property without corresponding improvements in protection is understandable.

Another general conclusion can be made from the pattern of agreement regarding the most favorable methods of flood hazard control.

Those measures which are used to react to an emergency situation without any long-lasting governmental control are viewed most favorably. It is probable that respondents perceive flood warning and disaster relief as methods which have potential benefits with little (or at least distant) attendant cost.

The structural methods received the second place rankings. Existing structures have been in place for some time, which may explain their general acceptance, in part. In addition, the burden of accommodating new structures may be seen as falling on others. For instance, when a dam is built, those who own land upstream must sell their property, not those who benefit from the protection. All of the third-ranked methods involve some degree of governmental control. In general, the more the control, the less favorably these methods were viewed by respondents.

A final question to respondents posed several possible alternative approaches to flood hazard control: (1) keep things as they are, (2) build more dams and dikes, (3) use measures restricting property rights, (4) offer owners incentives, and (5) public purchase of endangered areas. Each respondent was asked which approach seemed best on the whole for Northampton. Table 29 shows that neither group was particularly in favor of offering incentives or purchasing property as the best approach. The Northampton sample particularly supported restricting rights through zoning, the purchase of easements, or other methods. They also supported leaving things as they are now except for improving flood warning and disaster relief. They were not in favor of increasing reliance on dams and dikes.

The flood plain respondents, on the other hand, were supportive of increasing reliance on dams and dikes. However, they were equally supportive of restricting property rights and leaving things as they are now. While such simplistic alternatives do not genuinely reflect the respondents' possible support of multi-faceted approaches which may actually be proposed, the data does present information about the public's reactions when offered relatively distinct alternatives.

4. Flood Plain Residents' Property

Several questions were asked of flood plain respondents to better understand their particular living circumstances as these relate to flood hazard. The results are summarized in Table 30. Most of these flood plain structures are owner occupied (86.5%). While nearly all have public water (92.3%), less than half (44.2%) benefit from public sewerage. Most (83.3%) were aware of the flood hazard which they faced when they moved to the location, yet few (34.6%) have done anything to lessen potential flood damages to their buildings. The relation between home ownership and preparing for a future flood is

Table 29
Comparison of Flood Plain and Northampton
Residents' Most Favored Approach to
Controlling Flood Hazard

WHICH ONE APPROACH IS BEST FOR NORTHAMPTON?				
Approach	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Keep things as they are	13	25.0	69	32.5
Build more dams and dikes	15	28.8	11	5.2
Restrict property rights	14	26.9	93	43.9
Offer owners incentives	6	11.5	30	14.2
Public purchase of property	<u>4</u>	<u>7.7</u>	<u>9</u>	<u>4.2</u>
Total	52	99.9	212	100.0

Note: Chi squared = 28.67084*** Degrees of freedom = 4
Contingency coefficient = .31299

shown in Table 31. There seems to be a tendency for owners to be more willing than non-owners to spend their resources on protection. However, the number of non-owner respondents is rather small, making the comparison somewhat weak.

5. Participation in Public Affairs

A series of questions was asked of both respondent groups in order to determine the extent to which they participate in public affairs. The questions were asked in the context of an interview concerning flood hazards, but it was made clear that the intent was to gauge participation in public affairs of any kind. The responses to these questions are summarized in Table 32.

In general, the results indicate that respondents have a highly favorable evaluation of their voting record--an evaluation which far exceeds normal voter participation rates in elections. Sixty-five percent of the Northampton respondents and 80% of the flood plain

Table 30
 Characteristics of Flood Plain Residents' Property

Question	Responses of Flood Plain Residents in Percents		
	Yes	No	N
Do you own this building?	86.5	13.5	52
Is the building served with city water?	92.3	7.7	52
Is the building on a city sewer line?	44.2	55.8	52
Has any flood proofing been done?	32.0	68.0	50
Have you spent any of your own resources to protect against floods?	34.6	65.4	52
Were you aware of flood hazards when you moved here?	83.3	16.7	48

Table 31
 Investment by Flood Plain Residents in
 Flood Protection Measures

HAVE YOU SPENT ANY OF YOUR OWN MONEY OR DONE ANYTHING TO PROTECT YOUR PROPERTY FROM FUTURE FLOOD DAMAGE?				
Response	Owners		Non-owners	
	N	%	N	%
Yes	17	37.8	1	14.3
No	28	62.2	6	85.7
Total	45	100.0	7	100.0

Note: Chi squared = .62148^{n.s.} Degrees of freedom = 1

Table 32

Comparison of Flood Plain and Northampton Residents' Participation in Public Affairs

Method	Significance	Flood Plain Residents	Northampton Residents		95% Confidence Interval
		Mean	Mean	Standard Deviation	
Voted in local election ^a	***	1.59	2.11	.08	1.96-2.27
Voted in national election ^a	***	1.35	1.68	.08	1.53-1.82
Civic group participation ^b	***	2.73	3.18	.08	3.03-3.34
Attended meeting on public issue ^c	***	2.45	3.31	.09	3.14-3.49

^aAnswer scale ranged from 1 (every election) to 4 (none or hardly ever).

^bAnswer scale ranged from 1 (very often) to 4 (never or hardly ever).

^cOnly the 115 Northampton and 42 flood plain residents who said they had been aware of a public meeting are included.

respondents say that they vote in every national election. Such forms of selective memory and positive self-evaluation are common phenomena in opinion surveys; however, one might assume that these survey results accurately reflect the relative relationships of voting behavior. Under these conditions, one finds that flood plain respondents are much more likely to vote than Northampton respondents. When comparing the responses of Northampton respondents one finds that they are significantly less likely to vote in a local election ($t = -8.24$, degrees of freedom = 205, $p < .001$). For the same comparison, the magnitude of difference between the means is much less for flood plain respondents, indicating that they may have more similar voting patterns for national and local elections.

When asked if they participate in local civic-minded organizations, respondents indicated that they generally do not take this avenue of public expression. On the average, flood plain respondents were much more likely to attempt to influence public policy through participation in organizations. Of the Northampton sample, 62% indicated that they never or hardly ever participate, while 41% of the flood plain respondents gave the same indication.

Another question asked whether or not respondents had been aware of a public meeting being held in the past year or so to discuss some important public issue. Of the Northampton sample, 54% indicated that they had, while 81% of the flood plain respondents gave the same indication. Of those who knew about a public meeting, flood plain respondents were much more likely to actually attend it. This result may have resulted partly because of the relative prominence of local flood plain related issues around the time this survey was conducted. However, this record, as well as the record for participating in civic organizations, is not very impressive when compared to the optimistic evaluations of their voting record.

Possibly the most important conclusion which can be drawn from these results is that a public meeting may not be a very effective method for collecting information about public opinion. While a majority of those sampled do not attend public meetings, they were willing to cooperate in providing public planners with their opinions via the medium of an opinion survey.

6. Demographic Characteristics

Table 33 shows that in most of their demographic characteristics, the flood plain residents differed significantly from the sample of Northampton residents. In reviewing this table, one should keep in mind that households, and not individuals, were the actual unit of interest. Therefore, these data refer to that individual who is representing the household. Interviewers were instructed to accept only persons 18 years of age or older as household representatives.

Table 33

Comparison of Demographic Characteristics of Flood Plain and Northampton Residents

Characteristic	Significance	Flood Plain Residents	Northampton Residents		95% Confidence Interval
		Mean	Mean	Standard Deviation	
Sex in proportion of women	***	.32	.49	.21	.42- .56
Age in years	***	49.64	43.42	1.18	41.11-45.73
Education in years completed	***	12.06	13.81	.20	13.43-14.20
% of life spent in Northampton area	**	67.63	61.29	2.39	56.61-65.96
% of life spent in present house	***	46.36	29.82	27.18	26.17-33.48
Household size in number of persons	n.s.	3.33	3.13	.11	2.92- 3.34

There were significantly more male respondents among the flood plain respondents (68%) than in the Northampton sample (51%). However, both sexes were well represented in both groups. The flood plain respondents were also significantly older (49.6 years) than the Northampton respondents (43.4 years). In addition, the flood plain respondents have spent a significantly greater portion of their lives in the Northampton area (67.6%) and in the house in which they are presently living (46.3%) than the Northampton sample's respondents (61.3% and 27.2%, respectively). Flood plain residents also have less formal education (12.1 years) than Northampton respondents (13.8 years). The pattern of occupation for both groups of respondents, as shown in Table 34, is also significantly different ($\chi^2 = 35.4^{***}$, degrees of freedom = 13) with the Northampton respondents tending toward professional-service-student occupations while flood plain respondents tended toward crafts-labor-retired activities. The only characteristic for which there is no statistically significant difference is the size of household. One might note parenthetically that this is the only characteristic relevant to the sampling unit, per se. The reasons for these differences are not known. A strict interpretation would be that interviews were conducted with flood plain household representatives who tended more to be males, were older and had less formal education than the representatives of the Northampton households. It is possible that these characteristics also reflect real differences between the populations of individuals living on the flood plain and in Northampton. However, some of the difference in age and the proportion of men may be only an artifact of the interviewing process. Interviewers deliberately sought out persons who were substantially responsible for the household to represent flood plain households. This was not true for the Northampton sample, where persons whose names had been selected at random were sought.

7. Principal Components

The consultants' experience with regional and resource planning has led them to conclude that such rigid alternatives as those presented in the questionnaire are not compatible with real world situations and decision making processes. The comments and evaluations provided by the interviewing staff lead to the belief that the public does not see the possible alternative approaches as being so cut-and-dried either. However, the oversimplifications of the questionnaire format were considered an adequate and necessary starting point for the investigation. The collected data make it possible to proceed to a statistical technique that makes it possible to obtain a clearer sense of which general flood management approaches the respondents tend to perceive as belonging together.

The statistical method employed is termed "principal component analysis." The procedure involves a quantitative comparison of the variation in evaluation among the alternatives to determine which

Table 34
Comparison of Occupations of Flood Plain
and Northampton Residents

Occupation	Flood Plain Residents		Northampton Residents	
	N	%	n	%
Professional	3	6.0	51	24.2
Managerial	7	14.0	20	9.5
Clerical	0	0	10	4.7
Sales	1	2.0	4	1.9
Craftsperson	5	10.0	10	4.7
Operative	4	8.0	11	5.2
Laborer	4	8.0	5	2.4
Household Worker	3	6.0	2	.9
Service Worker	2	4.0	17	8.1
Farmer	3	6.0	1	.5
Homemaker	6	12.0	25	11.8
Student	2	4.0	22	10.4
Retired	10	20.0	26	12.3
Unemployed	0	0	7	3.3
Total	50	100.0	211	99.9

Note: Chi squared = 35.3861*** Degrees of freedom = 13
Contingency coefficient = .34553

alternatives respondents seem to rate in a similar fashion. These patterns are extracted as principal components; the first principal component describes the most consistent theme which underlies the respondents' ratings. The second principal component describes the most consistent theme in the variations which remain among the ratings. It is a characteristic of the analysis that these two principal components are totally uncorrelated to each other. Similarly, other uncorrelated principal components can be extracted which describe themes in the public's evaluation of alternative flood hazard control methods.

The most easily understood form in which to present each principal component is to list its correlations (termed "loadings") with the various ratings from which they are formed.

The four most important themes which seem to underlie the Northampton respondents' evaluations of control measures were extrapolated from the loadings shown in Tables 35 through 38. The first theme describes 19.2% of the variation among the Northampton respondents. In essence it seems to describe an approach which relies primarily on land use control measures such as zoning, public easements and a federal flood insurance program. The second most important theme which underlies the general public's ratings involves the structural approaches, such as dams and dikes, supplemented by flood warning and disaster relief. A total of 13.3% of the variation among respondents is described by the second theme. The third theme describes an additional 11.1% of the total variation and it is less coherent than the first two. Yet it seems to be focusing on large public expenditures, such as dikes and the public purchase of threatened land, and against private expenditures such as flood proofing. In contrast, the fourth theme focuses on an individual's responsibilities and opportunities, namely flood proofing, and shuns dependence on public aid. This is also a less coherent approach, although it accounts for 9.0% of the variation in responses.

Among the flood plain respondents, the first two principal components are clearly similar to those for the Northampton respondents, as seen from Tables 39 and 40. The first, describing 24.1% of the variance, is clearly oriented towards public programs controlling land use. The second theme is just as clearly a structural alternative. It describes 15.8% of the variation among the respondents. The last two components seem to be formulated from the flood plain resident's particular point of view. In one instance, 10.1% of the variation in responses seems to focus on preserving the individual's independence of action (see Table 41). While dams are seen to work and flood proofing is approved, there is a weakly negative series of correlations to public programs in general. The exceptions are strong loadings on flood warning, evacuation and relief, all of which are methods which assist the individual in maintaining independence of action. The last theme, which describes 9.1% of the variation, seems to center around general public assistance (see Table 42). Flood proofing one's own home is looked on negatively while relief receives positive loadings. The general trend among the weak loadings is toward public programs.

The similarities among the two groups' orientation are striking. Both share strong land use control and structural protection themes in describing their evaluations of measures to control flood hazards. In addition, they both share weaker themes of public and individualistic responsibilities. However, both view these latter themes from their own distinct orientation. The flood plain respondents seem interested in what benefits they receive and the Northampton respondents

Table 35

Northampton Residents' First Principal Component:
Land Use Control Methods

Question	Loadings		
	High	Moderate	Low
Do dams work?			.039
Should dams be used?			.041
Do dikes work?			-.075
Should dikes be used?			-.082
Does flood plain zoning work?	.622		
Should flood plain zoning be used?	.525		
Does flood insurance work?	.676		
Should flood insurance be used?	.620		
Does flood proofing work?			.132
Should flood proofing be used?			.117
Does public purchase work?	.596		
Should public purchase be used?		.481	
Do easements work?	.524		
Should easements be used?	.580		
Does flood warning work?			.267
Should flood warning be used?		.464	
Does disaster relief work?		.366	
Should disaster relief be used?	.537		

Note: The sample size for the Northampton survey is 215. Missing data are deleted in a pairwise fashion, therefore the effective sample size ranges between 215 and 179.

This component has an eigen value of 3.456 which accounts for 19.2% of the total variance.

Table 36

Northampton Residents' Second Principal Component:
Structural Methods

Question	Loadings		
	High	Moderate	Low
Do dams work?	.542		
Should dams be used?	.617		
Do dikes work?	.601		
Should dikes be used?	.666		
Does flood plain zoning work?			-.177
Should flood plain zoning be used?			-.095
Does flood insurance work?			-.018
Should flood insurance be used?			-.035
Does flood proofing work?			.235
Should flood proofing be used?			.058
Does public purchase work?			-.013
Should public purchase be used?			-.217
Do easements work?			-.208
Should easements be used?			-.255
Does flood warning work?	.530		
Should flood warning be used?		.331	
Does disaster relief work?		.465	
Should disaster relief be used?			.212

Note: The sample size for the Northampton survey is 215. Missing data are deleted in a pairwise fashion, therefore the effective sample size ranges between 215 and 179.

This component has an eigen value of 2.386 which accounts for 13.3% of the total variation.

Table 37

Northampton Residents' Third Principal Component:
Public's Responsibility

Question	Loadings		
	High	Moderate	Low
Do dams work?		.306	
Should dams be used?			.230
Do dikes work?		.351	
Should dikes be used?		.343	
Does flood plain zoning work?			.155
Should flood plain zoning be used?			.174
Does flood insurance work?			-.262
Should flood insurance be used?		-.380	
Does flood proofing work?	-.584		
Should flood proofing be used?	-.571		
Does public purchase work?		.369	
Should public purchase be used?		.340	
Do easements work?		.396	
Should easements be used?			.280
Does flood warning work?			-.158
Should flood warning be used?			-.267
Does disaster relief work?			-.226
Should disaster relief be used?			-.191

Note: The sample size for the Northampton survey is 215. Missing data are deleted in a pairwise fashion, therefore the effective sample size ranges between 215 and 179.

This component has an eigen value of 1.993 which accounts for 11.1% of the total variance.

Table 38

Northampton Residents' Fourth Principal Component:
Individual's Responsibility

Question	Loadings		
	High	Moderate	Low
Do dams work?		.367	
Should dams be used?			.0347
Do dikes work?			.239
Should dikes be used?			.047
Does flood plain zoning work?			.107
Should flood plain zoning be used?			-.057
Does flood insurance work?			-.101
Should flood insurance be used?			-.068
Does flood proofing work?	.639		
Should flood proofing be used?	.704		
Does public purchase work?			.170
Should public purchase be used?			.134
Do easements work?			.253
Should easements be used?			.124
Does flood warning work?			-.225
Should flood warning be used?		-.359	
Does disaster relief work?		-.414	
Should disaster relief be used?			-.148

Note: The sample size for the Northampton survey is 215. Missing data are deleted in a pairwise fashion, therefore the effective sample size ranges between 215 and 179.

This component has an eigen value of 1.628 which accounts for 9.0% of the total variance.

Table 39

Flood Plain Residents' First Principal Component:
Land Use Control Methods

Question	Loadings		
	High	Moderate	Low
Do dams work?		-.306	
Should dams be used?			-.154
Do dikes work?			-.244
Should dikes be used?			-.229
Does flood plain zoning work?	.845		
Should flood plain zoning be used?	.789		
Does flood insurance work?	.664		
Should flood insurance be used?	.707		
Does flood proofing work?			.203
Should flood proofing be used?		.424	
Does public purchase work?		.464	
Should public purchase be used?		.448	
Do easements work?	.679		
Should easements be used?	.749		
Does flood warning work?			-.297
Should flood warning be used?			-.140
Does disaster relief work?			-.074
Should disaster relief be used?			.250

Note: The flood plain census included 53 interviews. Missing data are deleted in a pairwise fashion, therefore the effective population size ranges between 52 and 47.

This component has an eigen value of 4.341 which accounts for 24.1% of the total variance.

Table 40

Flood Plain Residents' Second Principal Component:
Structural Methods

Question	Loadings		
	High	Moderate	Low
Do dams work?	.549		
Should dams be used?	.672		
Do dikes work?	.588		
Should dikes be used?	.598		
Does flood plain zoning work?			.276
Should flood plain zoning be used?			-.064
Does flood insurance work?			-.061
Should flood insurance be used?			-.264
Does flood proofing work?			-.336
Should flood proofing be used?			.231
Does public purchase work?		.486	
Should public purchase be used?			.299
Do easements work?		.458	
Should easements be used?			.196
Does flood warning work?	.528		
Should flood warning be used?		.306	
Does disaster relief work?			-.237
Should disaster relief be used?			-.275

Note: The flood plain census included 53 interviews. Missing data are deleted in a pairwise fashion, therefore the effective population size ranges between 52 and 47.

This component has an eigen value of 2.852 which accounts for 15.8% of the total variance.

Table 41

Flood Plain Residents' Third Principal Component:
Individual Independence

Question	Loadings		
	High	Moderate	Low
Do dams work?		.374	
Should dams be used?			-.208
Do dikes work?			-.059
Should dikes be used?			-.270
Does flood plain zoning work?			.052
Should flood plain zoning be used?			.154
Does flood insurance work?			.123
Should flood insurance be used?			.078
Does flood proofing work?			-.008
Should flood proofing be used?		.317	
Does public purchase work?			-.237
Should public purchase be used?			-.146
Do easements work?			-.051
Should easements be used?			-.002
Does flood warning work?	.596		
Should flood warning be used?	.660		
Does disaster relief work?	.620		
Should disaster relief be used?		.393	

Note: The flood plain census included 53 interviews. Missing data are deleted in a pairwise fashion, therefore the effective population size ranges between 52 and 47.

This component has an eigen value of 1.817 which accounts for 10.1% of the total variance.

Table 42

Flood Plain Residents' Fourth Principal Component:
Public Assistance

Question	Loadings		
	High	Moderate	Low
Do dams work?			-.253
Should dams be used?			-.153
Do dikes work?			.231
Should dikes be used?			.298
Does flood plain zoning work?			-.060
Should flood plain zoning be used?			-.110
Does flood insurance work?			.086
Should flood insurance be used?			.034
Does flood proofing work?	-.609		
Should flood proofing be used?	-.583		
Does public purchase work?			.208
Should public purchase be used?			.052
Do easements work?			.018
Should easements be used?			.279
Does flood warning work?			.040
Should flood warning be used?			-.196
Does disaster relief work?		.488	
Should disaster relief be used?	.520		

Note: The flood plain census included 53 interviews. Missing data are deleted in a pairwise fashion, therefore the effective population size ranges between 52 and 47.

This component has an eigen value of 1.637 which accounts for 9.1% of the total variance.

appear to have a more remote interest. In either case, it is useful to note that these themes are unrelated to one another by the nature of their extraction. Therefore, the land use control and structural components should not be viewed as opposite poles for a single theme. Rather they are judged independently of each other. The same is true for public and private roles. There is no correlation between ratings based on one theme and those from another. This interpretation may provide useful insight when presenting future alternatives.

8. An Impressionistic View of Flood Plain Residents' Attitudes

This section summarizes impressions gathered from contacts with flood plain residents during the survey interviewing process. The observations apply to residents of the Ox-Bow and Three County Fairgrounds areas where most flood plain residences are located. These comments provide insight into the data discussed above.

The effects of the timing of the survey were noted. People had been repeatedly contacted about flood plain issues and importuned to attend meetings and seminars. For some, the reaction was a desire to be left alone and be done with the subject.


For several people, the most important flood issue was the condition of local roads. Access to substantial parts of each of the two areas is confined to a single road, generally in poor condition or unpaved in part. During periods of very wet weather, Island Road in the Ox-Bow is submerged, and unpaved road sections near the Fairgrounds become very muddy. Emergency traffic is thus seriously hampered. Roads are, in fact, a sore subject in both locations but especially in the Ox-Bow. On summer weekends, parked cars and boat trailers belonging to people using the marina at the end of Island Road crowd the roadway and sometimes damage lawns. In some instances farmers have been effectively prevented from moving heavy farm equipment to their fields. (The new parking area under construction at the marina should alleviate the condition.) Near the Fairgrounds, serious road congestion is usually limited to several days around Labor Day during the annual fair and ten-day horse racing period. The large number of vehicles offers one advantage for property holders near the Fairgrounds. They can augment their income a little by renting parking space.

Most people preferred the traditional dam and dike approach to flood control, even though the Ox-Bow people live on the river side of the dike and several Fairground people believe their dike system is "not worth a damn."

Opposition to more recently initiated non-structural flood management methods appears to stem partly from the innovative nature of the

methods which goes against the grain of the close-knit, traditional neighborhood people. Flood plain zoning and wetlands regulations have apparently been widely misunderstood by residents of the two areas, despite efforts on the part of public officials to explain what is really involved. Flood plain zoning is also under suspicion because it is involved in Northampton's "zoning politics." There seems to be a fairly widespread sense of unequal treatment and powerlessness concerning the application of zoning in general. Apropos of the proposed skating rink at the Fairgrounds, "Anyone with enough money can come in here and get the city to let them build whatever they want."

Despite the mistrust, many people think flood plain zoning is a wise policy and are not against it so long as they are allowed to make improvements to their property such as building a new garage or fixing up an old barn. A very few flood plain residents strongly favor land use controls on environmental grounds.

 The conception of what constitutes a flood is an important element in the thinking of flood plain residents who remember the floods of 1955, 1938, and 1936. To them, water on the lawn and eight inches or so in the basement is not a flood. Long-term experience has made some people feel more expert about the river than the "experts." This has consequences for the flood warning and evacuation system; there are people who trust their own judgment more than that of officialdom when it comes to deciding if evacuation is advisable. Furthermore, flood proofing is regarded as ineffective by the people who remember big floods. Waterproof doors and window shields would surely leak and "it's better to let the water come through your cellar and lose a few cardboard boxes than to have the whole house come down because of the pressure on the [shielded building]."

III. INFORMAL INTERVIEWS

A. Government Officials

1. State and Federal Officials

The following state and federal officials were interviewed.

Massachusetts:

Department of Environmental Management

Matthew Connolly, Director, Division of Fisheries and Wildlife
Robert Yaro, Director of Planning

Department of Environmental Quality Engineering

Charles Kennedy, Director, Division of Water Resources
James Coleman, Wetlands Control Officer

Department of Food and Agriculture

Fred Winthrop, Commissioner

Department of Public Works

Jack Hurley, Director, Environmental Section

Department of Commerce

Claude Lanscome, Assistant Commissioner

Department of Community Affairs

David Dronsick, Senior Planner

Lower Pioneer Valley Regional Planning Commission

Susan Cole, Director, Section 208 Program

United States:

Fish and Wildlife Service

Roger Reed, Leader, Cooperative Fisheries Research Unit

Soil Conservation Service

Benjamin Isgur, State Conservationist

The purpose of these interviews was to discuss the issues and policies involved in the use of non-structural versus structural means for controlling flood damage. The discussions centered on the consistency with which any alternatives among structural or non-structural approaches were viewed in terms of existing state or federal policies or programs. The interviews were done informally, that is, without a questionnaire. In each instance the discussion was directed toward the area of responsibility of the respondent and not toward general aspects of executive office policy. Thus, there were questions addressed in each interview that were exclusive to that interview in substance or in context. However, in all interviews, the non-structural alternatives presented in the Northampton survey questionnaire were offered for response and discussion.

Agency officials in the Executive Office of Environmental Affairs (EOEA)* were all consistent in their agreement with the need to increase non-structural approaches to flood damage control, though each agency had its own reasons why this was important. Each of the agency heads identified potential benefits to their respective programs from the implementation of various non-structural alternatives.

Robert Yaro felt that there was an opportunity to increase the amount of public recreation access to streams and riparian lands if the exercise of eminent domain was used carefully in accordance with the Commonwealth's outdoor recreation plan. Therefore he was the strongest in his approval of public acquisition of flood plain lands. He thought that the most effective way to do this was to support policies that would lead to attrition of flood plain development through land acquisition where there were flood damaged buildings. Mr. Yaro, as well as James Coleman, Matthew Connolly and Charles Kennedy, expressed some concern about the effects of flood insurance. They felt that the insurance program may encourage more construction on the flood plain. Despite these doubts, Mr. Kennedy indicated that the Division of Water Resources actively supported the participation of local governments in the insurance program. He recognized the need to offer protection to owners of existing property through subsidized insurance. He also felt that a weakness in the program was the failure to implement the provision to permanently remove flood damaged structures. He commented with reference to the winter coastal flooding in 1978 where the federal disaster relief program provided funds to restore buildings on the coastal flood plains. This action was contradictory to the Division of Water Resources outlook and Mr. Kennedy was concerned that disaster relief would be applied in the same way in cases of riverine flooding.

Commissioner Winthrop saw an opportunity to divert funds for structural alternatives to use for purchasing development rights from flood plain owners. He felt this would be an effective means to reduce

*EOEA includes the Departments of Environmental Management, Environmental Quality Engineering, and Food and Agriculture.

future construction on the flood plain, and, if this kind of effort were directed at agricultural lands, it would provide protection and new capital for agricultural production.

All of the EOE officials expressed sharp concern about the problems of reducing flood storage capacity by allowing continued building on the flood plain. Thus, none was sanguine about flood proofing measures. Flood proofing was viewed as an encouragement to continued flood plain occupancy which may, through the elevation of new structures on fill, cause even further loss of flood water storage in the future. Coleman, Connolly and Kennedy were especially concerned about this point. Even the potential for elevating structures on pilings was viewed by Mr. Coleman and Mr. Connolly as undesirable because there would be a change in ecology and a loss of wildlife habitat.

All EOE officials were very positive toward the use of local zoning as a means for preventing future use of flood plains for building sites. Only Commissioner Winthrop expressed some doubts, suggesting that in some cases exclusionary zoning could result in an unconstitutional "taking." Therefore, he felt that some compensation should be offered where those circumstances arose. Mr. Yaro suggested that zoning would be effective, but it does not in itself offer any new public access to the riverfront.

Two agency officials were doubtful about the policy of restricting or limiting use of the flood plain. Assistant Commissioner Lanscome of the Department of Commerce responded most negatively. He was concerned that further restrictions, regulations, or permit processes would simply add to what his Department saw as an already overburdening regulatory policy in the Commonwealth. He noted that a potential major industrial or commercial investor already has to face some 47 permit requirements from initial conception to final completion of a project. He stated that this was inhibiting the Department's program to encourage new capital investment. Mr. Lanscome was also concerned that sites having high location value to industry would be lost if flood plains were excluded from use. For this reason he was also doubtful about relocating industry because there might not be sites available of equivalent location value out of the flood plain areas.

David Dronsick of the Department of Community Affairs (DCA) suggested there was an ambivalent response in DCA toward federal or Commonwealth policies that might restrict flood plain use. He said that there was a strong policy in DCA to support the "home rule" concept and that the agency's assistance to towns often consisted of helping them cope with state requirements at the least loss to local initiatives. There was also some concern that restrictions on flood plain use might result in forcing low cost housing to locate on sites that cost more to develop. There was a positive outlook toward the flood insurance program and its flood-proofing requirement because that program would allow some use of flood plain lands.

Jack Hurley, discussing the location of state highways on flood plain lands, stated that the federal and state impact assessment process was effective in discouraging such uses. It was his view that the future for highway construction would be to locate off the flood plain unless there was a compelling cost factor in locating on it.

Susan Cole said that non-structural approaches would be generally consistent with the Lower Pioneer Valley "208" program* goals. She felt it would be advisable to avoid all residential uses where on-site septic systems were needed. She also felt that the flood insurance program might encourage increased use of flood plain lands unless there are strong controls through zoning.

Benjamin Isgur of the Soil Conservation Service indicated that he supported the increasing use of non-structural means in flood damage management. He said that his agency had shifted its policy in flood management from structural approaches (dams and channelization) to encouraging restrictions on flood plain uses. He cited the case of the proposed Mill River flood control project that had been abandoned at the agency's request. He said that a major reason for making the request to the project sponsors in Northampton was the belief that proper land and soil management plus strong zoning would be more effective in reducing flood damage.

Roger Reed was unequivocal in his support for non-structural approaches. He felt that any structural means would be counter to the program he participates in to restore an anadromous fishery in the Connecticut River. Dr. Reed was strong in his view that the river should be allowed to go through as natural a flow regime as possible. He felt the long history of power and flood control dams had already seriously impacted the river's ecology and he was against any further structural alterations of its flow or channel.

2. Local Officials

The Northampton officials interviewed included elected and appointed persons whose positions indicated they would have some interest and responsibility in flood management issues. Elected officials interviewed were the Mayor, Harry S. Chapman, and four City Council members whose electoral districts abut the Connecticut or Mill River: Leonard Budgar, Ward 3; Harold Craig, Ward 4; Charles Baranowski, Ward 6; and Carol Parsons, Ward 7. Appointed officials included board or commission members and administrative professionals:

*The program is authorized by Section 208 of the 1972 Water Quality Act Amendments. It calls for wide-scale regional planning directed particularly toward improving water quality.

Robert LaSalle, Chairman, City Planning Board
 Rutherford Platt, Member, City Planning Board
 York Phillips, Director, Planning Department
 Nancy Stack, Senior Planner
 Charles Dragon, Chairman, Board of Appeals
 Timothy Washburn, Chairman, Conservation Commission
 Robie Hubley, Member, Conservation Commission
 Richard B. Covell, Chairman, Northampton Industrial Development
 Financing Authority
 Bernard O'Connell, Chairman, Board of Assessors
 Daniel L. Labato, Acting Chief, Police Department
 James Murray, Chief Engineer, Fire Department
 Paul Knight, Director of Civil Defense
 Francis Sheehan, Assistant City Engineer, Department of Public
 Works
 Cecil Clark, Building Inspector
 Peter McErlain, Agent, Board of Health
 Ray Ellerbrook, Director, Recreation Department

Planning officials from other jurisdictions were:

Robert Kalish, Town Planner, Hadley
 Richard Gaffney, Hampshire County Planner
 Arthur Pichette, Hampshire County Assistant Planner

All officials were asked to comment on the effectiveness and desirability of the several approaches to flood hazard control, particularly with respect to their own responsibilities and, where applicable, the operations of their departments. Opinions on public support for or opposition to alternatives such as flood plain zoning and the flood insurance program were also sought.

Structures

There was no support mentioned for the idea of increasing structural protection against flooding. Most officials expressed satisfaction with existing levels of protection, although a few were concerned that people may feel too secure. Mr. Gaffney, County Planner, noted that people's sense of security may be a false one based on an insufficient regard for the unpredictable nature of weather conditions. Mr. Kalish expressed a similar concern, noting that the people of his town (Hadley) seemed convinced that there is no real risk of potentially disastrous floods. Mr. Hubley of the Conservation Commission stated that people who do not think there will be another flood are simply wrong.

Opposition to construction of new dams was based on considerations of fairness to other communities and fundamental objections to tampering with the river system. Mayor Chapman remarked on upstream social

economic dislocations that result from building dams and lakes and the downstream problems that can result from restricting flood water flow with dikes. He recognized a "city-wide" commitment not to develop the flood plain and favors the continuing acquisition of flood plain and other tracts for open space and conservation areas oriented toward passive recreational use. Mr. Platt of the Planning Board and Mr. Hubley emphasized the value of retaining the natural flood storage and ground water recharge functions of flood plains.

Few of the officials had given much serious thought to the possibility of raising the height of existing dikes.

There is some interest in exploring the possibility of restoring existing small dams along the Mill River for use as power sources. Mayor Chapman suggested this as a city-run enterprise, selling power to industrial and municipal users. He saw the idea as an interesting pilot project through which the people of the city could demonstrate their ability to work together and achieve a worthwhile end. A feasibility study now under way should give indications as to the practicality of the idea. Mr. LaSalle, Chairman of the Planning Board, is skeptical about the economic feasibility of such a plan, whether done as a network or as individual power sources operated by private industries, partly because of the probable high cost of maintenance resulting from siltation of the impoundments. He would prefer to see any available money invested in production of electricity from wastes.

Flood Plain Land Use Controls

Comments of the four City Council members interviewed indicate that flood plain issues are not, in general, a major political concern. Harold Craig (Ward 4), Charles Baranowski (Ward 6) and Carol Parsons (Ward 7) all reported little or no concern expressed to them about river-related subjects. Ms. Parsons, whose district is in Leeds, said that the condition of the dams on the Mill River has been and continues to be a matter of interest. All three of these districts have only a small portion of their geographic area in a flood risk area.

In Ward 3, the situation is somewhat different because it encompasses substantial flood plain areas, including the Ox-Bow and Fairgrounds sections. Leonard Budgar, Councilman, reports that support and opposition to flood plain zoning appears to be about equally divided, but that flood plain issues were not discussed in his recent campaign. His constituents had expressed concern about the flood insurance program, especially about losing their mortgages if they did not buy insurance and having to pay high premiums if they did. Clearly, there was widespread misunderstanding of the real nature of the program.

Perhaps the most sharply focused issues in Mr. Budgar's ward were the new marina and the proposed skating rink. The major concern

was with traffic congestion on local streets, not with flood plain zoning as such.

Nancy Stack of the Planning Department also commented on the misunderstandings about the zoning and insurance programs. She has been the person in her department who has dealt with both matters in detail and she has had considerable contact with the public. In her opinion, farmers did not seem to object to the regulations as long as they did not interfere with farming activities. Not everyone understood that relatively minor building repairs were exempt from the permitting process. Most flood plain residents have opposed the insurance program because of its compulsory nature (i.e., that it will be required for new mortgages). However, some people who have looked into it were surprised when they found out what the insurance program is really like and have bought insurance. After a very slow start, participation has increased so that by the end of May 1978 a total of 17 properties were insured.

York Phillips, City Planner, feels that the suspicions that "money talks" in the application of flood plain zoning are based on incomplete understanding on the part of the public of the various situations that arise. He expressed the wish that more complete newspaper coverage was offered.

On the whole, it appears that inadequate information and concerns that are tangential to zoning as such have been root causes of a substantial proportion of opposition to the insurance/zoning set of regulations expressed by flood plain residents, and that more generally there is currently a background of neutrality toward the issue.

In general, Northampton's flood plain zoning was considered by administrative officials and board members to be wise policy in terms of preserving the riverine hydrologic and biologic functions, preventing increases in flood damage, and retaining agricultural use of valuable farm lands. There seemed to be confidence that the zoning and wetlands regulations would be well enforced at least for the present because of the commitment of Zoning Board of Appeals and Conservation Commission members.

Mr. LaSalle has confidence in enforcement at present but he foresaw that problems might arise because of increased development pressure and different attitudes of future board and commission members. He thinks that in terms of acceptability to the public, flood plain zoning came at a fortuitous time when the City's economy was in a period of slow growth, as it still is. He expects that demands for additional development might result, perhaps within twenty years, from the planned sewer line along the Mill River, sewer pump stations that might be installed to make it possible to serve flood plain occupants, increasing demand for recreational facilities along the Connecticut River as the quality of its water improves and a salmon sport

fishery perhaps becomes possible, and desire on the part of existing flood plain industries to expand. He expects, though, that with the passage of time flood plain controls will be an increasingly accepted aspect of the way things are--something that just exists the way other forms of control over people's activities do.

Charles Dragon, Chairman of the Zoning Board of Appeals, regards flood plain zoning as a necessity. So far, there have been only two applications for special flood plain permits to come before the board--one for the new Ox-Bow Marina and the other for a residence. This low level of activity supports the view that development pressure at this time is not great.

Mr. Platt commented that Northampton enjoyed a considerable advantage over most New England local governments in adopting flood plain zoning because of its form of government. The fact that it is a city with a mayor and council, rather than a town governed by town meeting, means that there is an executive position and a legislature of manageable size to provide a focus of leadership and action. Also, the leadership of Sean Dunphy, Mayor at the time flood plain zoning was adopted, was a significant factor. Mr. Platt is concerned about the strength and equity of enforcement in the future. He pointed out that structures such as dams and dikes become politically "neutral" once they are in place. However, lines on a flood plain rate map are subject to controversy and cannot always be followed precisely in establishing and maintaining zoning districts because of special local or individual circumstances. He suggested the need for some outside supervisory authority, perhaps from the Regional Planning Agency, a state administrative department, or perhaps even the State Attorney General's office. However, he believes the state does not presently have sufficient staff to handle this responsibility.

Mr. Hubley thinks the city's regulations are satisfactory but finds the city to be an inadequate level of government to deal with issues which by their nature are of the scale of the watershed. The comment was not intended as a criticism of Northampton at all, but rather of the unfairness of placing responsibility where it cannot fully be handled. Northampton's efforts are meaningful and good, but inherently inadequate to the task without similar controls being instituted throughout the region.

Timothy Washburn, Chairman of the Conservation Commission, expects that flood plain zoning will be applied effectively. He notes that people are quite aware of flooding conditions and the consequent unsuitability of some flood plain areas for development. In his view, agriculture is the best use for much of the flood plain and should be maintained there.

Several officials stated that they did not expect pressure for new industrial development in the flood plain because other suitable

locations, especially the industrial park, are available. Richard Covell concurs in this opinion. He is Chairman of the Industrial Development Financing Authority, a group that helps arrange financing for new industrial purchasers and developers. He is not aware of any plans for new businesses in the Ox-Bow or Fairgrounds areas. Members of the Authority are conscious of flooding as something to be considered in terms of the location choices of new developers. However, this has not been a particularly significant issue since the authority has so far been satisfied with the structural precautions taken in the very few instances where possible flooding has been a factor. As a matter of general principle, Mr. Covell would prefer to see development occur in the industrial park or within already urbanized areas, perhaps contributing to the renewal of parts of the city in the vicinity of the Mill River.

Cecil Clark, Building Inspector, is the official responsible for zoning enforcement. He feels that flood plain land use controls are a benefit to buyers who might not otherwise be aware of flood risks. He thinks that the zoning is in some ways overly restrictive and needs reconsideration. For example, the need to demonstrate effects on flood levels caused by filling requires measurements that in a practical sense can hardly be made. Remembering the devastation of the 1930's floods, he is skeptical of the effectiveness of flood proofing; the flood proofing that has been done has yet to be tested by a major flood.

From the point of view of Bernard O'Connell, the City Assessor, there would be little impact on property taxes from either flood insurance or flood plain zoning. He noted that people have always been aware of the flood potential and that most of the flood plain is farm land and has been assessed as such.

With respect to flooding and public health, the main concerns expressed by Peter McErlain (Agent, Board of Health) were contamination from septic systems and possible disruption of water supply. Although temporary flooding in low areas results in septic pollution of the rivers, it is not a public health concern because of rapid and thorough dilution. He favors sewerage in the Mill River flood plain area because of septic system problems. The Fairgrounds is another problem area, and the addition of a skating rink would make municipal sewerage (with a pump station) a necessity.

The Recreation Department, directed by Ray Ellerbrook, is responsible for programming and scheduling of city recreation on city facilities, but maintenance is the responsibility of the Department of Public Works. He reported occasional damage to facilities that required relatively minor repairs. Other than this, flood management issues are of no direct concern to his department.

Relocation

Government purchase of property and relocation of persons to areas outside the flood plain are questions that officials felt required very thoughtful consideration. In general, they expected no action to be taken except perhaps in a post-flood situation. Their feeling was that preventing new flood plain encroachment was a more equitable and economically feasible approach. York Phillips thought that farmers especially needed to live in flood prone areas where their fields are.

Flood Warning and Evacuation

Among the officials directly responsible for flood warning and evacuation services, there is confidence that the system has been well thought out and is, on the whole, workable. The Department of Public Works is responsible for monitoring river levels. Francis Sheehan, Assistant City Engineer, reports that the responsibility applies at any time on any day. It is very important because the emergency operations manual is keyed to flood levels.

Civil Defense Director Paul Knight feels that the flood watch, warning and evacuation system is a good one based on a model plan. He finds cooperation good in emergency situations among the other Hampshire County towns both in terms of mutual assistance with personnel and equipment and in accepting his authority as the person in charge. There is also good coordination with state officials. Emergency shelter and feeding of 800 persons up to five days are planned for, with extra capacity also available. From spring through fall some 30 to 50 private boats are available for emergency work since this is the local boating season. His major fear is that people will refuse to be evacuated, thus creating hazards for themselves and rescue workers.

The Police Department, under Acting Chief Labato, is responsible for alerting and evacuating people in an emergency. The department keeps watch during periods of high water and closes some roads occasionally. They maintain a list of all families to be warned. However, some people have lived in flood areas for a long time and will not leave on the basis of a police warning. The department does not have the authority to require evacuation except during a declared state of emergency.

Fire Chief Murray also thinks the plan works smoothly and does not suggest any changes. The fire department is responsible for assisting with evacuation and rescue and the use of boats for rescue.

All departments keep themselves familiar with emergency plans and procedures.

Summary

Satisfaction with existing structural protection, flood plain zoning and emergency preparations is widespread among the officials interviewed. The most important reservations about flood plain zoning relate to concerns about the effectiveness of enforcement in the future. There is an obvious commitment to the policy of controlling flood hazards through regulation of flood plain use. From their contacts with the general public, they sense support for or at least lack of opposition to the policy except among the relatively small number of people who may be directly affected. Some opposition is based on lack of understanding.

B. Flood Plain Businesses

There are seven relatively large businesses located in Northampton's flood plain. Personnel from these seven businesses were interviewed to gain insight into their attitudes toward flood hazard and flood plain regulations. The businesses are as follows:

Berkshire Electric Cable Co.
 Vistron Corp. (Pro-Brush Division)
 Northampton Manufacturing Corp.
 LaFleur Airport
 Ox-Bow Marina
 Packaging Corporation of America (Tri-City Container Plant)
 Colonial Hilton Inn

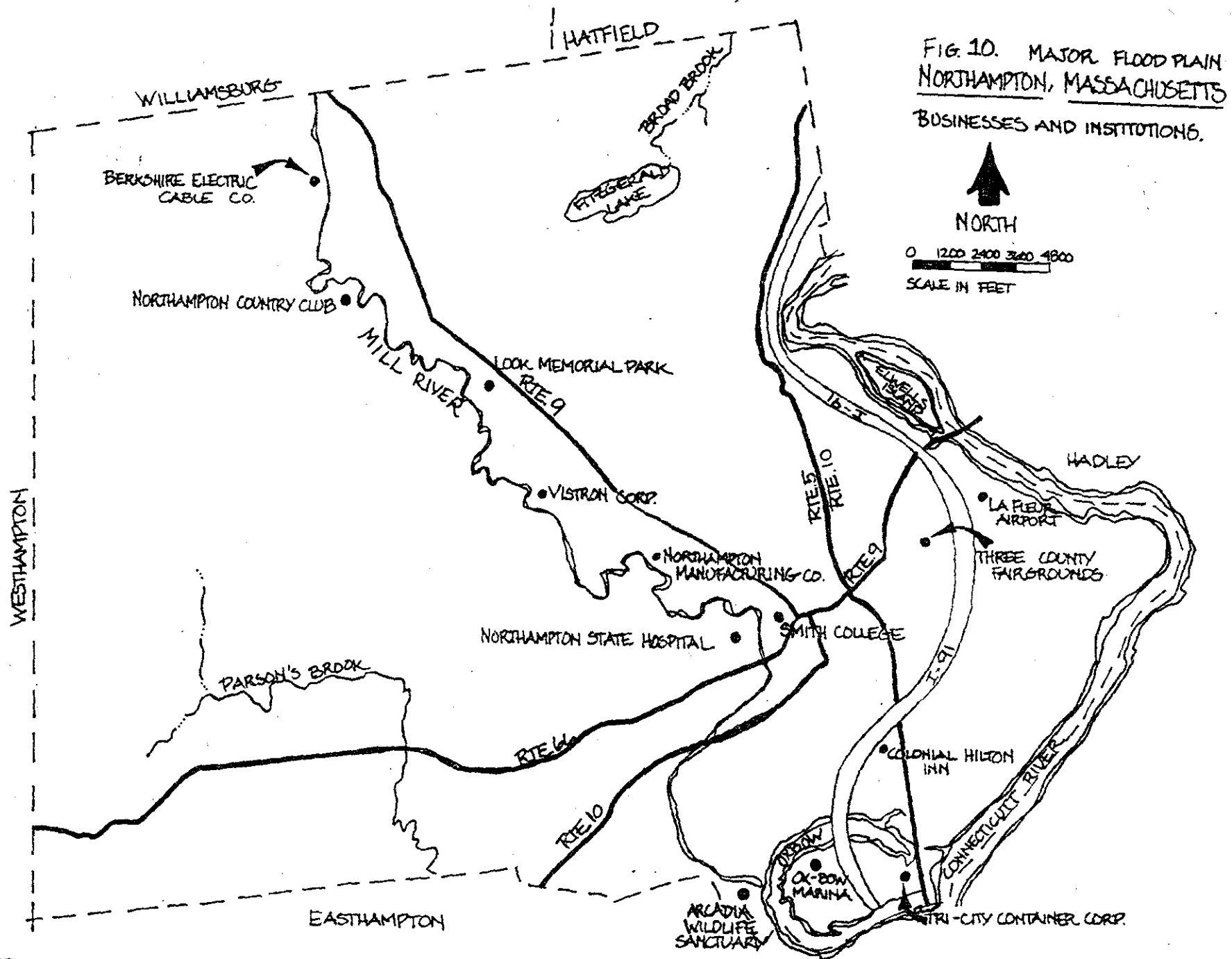
Managers and owners were asked a series of questions covering the following topics:

1) Flood experience at the plant or facility, including the nature of any damage suffered (property damage, personal injury, loss of income, having to close the facility), helpfulness of existing flood warning and/or evacuation programs, and assistance received under disaster relief programs.

2) Precautions taken to mitigate possible future flood losses (i.e., flood proofing of structures or acquiring flood insurance).

3) Effects of flood plain zoning, building code regulations, or other flood insurance requirements on the business and its long-run well-being.

4) Consequences of future serious flood damage with respect to the possibility of relocating elsewhere within or beyond the Northampton area.



The substance of these interviews is summarized below.

Berkshire Electric Cable Co.

The person interviewed at Berkshire Electric Cable was Mr. Garson Fields, Finance Chairman of the firm. He pointed out that there had not been any flood damage at that location in the past 100 years. The firm does not anticipate a flood hazard and, therefore, no preventative measures have been taken or are planned. Mr. Fields was not concerned about flood danger, and expressed the belief that government should not be involved in any forced regulation of businesses in flood hazard areas.

Vistron Corp.

The person interviewed at Vistron was Mr. Charles Gaudry, Manager of Services and Personnel. He mentioned that there had been some minor damage to inventory in 1958; however, the inventory had then been placed on higher pallets, eliminating the problem. He indicated that problems did not arise from flooding of the river, but from surface water runoff. To prevent any such problems, the firm has installed large pumps in the basement. He characterized the situation as a "minor inconvenience."

The firm does not carry flood insurance and does not believe that there is any real threat of flood damage from the river.

Vistron's most recent building was built on the property in 1969 and the firm has considered expanding its facilities by constructing four 90,000-square-foot buildings which would be important to the local economy. Mr. Gaudry pointed out, however, that the possibility of being prohibited from building after undertaking the expense of study and design work has led to uncertainty on the part of the owners. Mr. Gaudry felt that this situation might cause Vistron to relocate; given other considerations of taxes, etc., the firm could possibly consider a move out of Massachusetts. He was not supportive of any government restrictions.

Northampton Manufacturing Corp.

Mr. John Wilder, the Vice-President of Engineering, was interviewed at Northampton Manufacturing Corp. He indicated that the firm had never experienced any real flooding damage and only some minor inconveniences in 1958. He does not foresee any real hazard; consequently, there have been no preventative measures taken at the company.

Mr. Wilder's attitude toward regulation is negative. He believes that the government should make information available to businesses and be of assistance, but that firms should have the right to assess their own risks and act accordingly without restriction.

LaFleur Airport

Mr. Laurent LaFleur, until recently the owner and manager of the airport, told interviewers that since it began operations in 1938, the airport has only been closed for one day due to flooding. He believes that there is sufficient flood protection from the dams that have been constructed and sees no real threat from floods. He carries no flood insurance.

Mr. LaFleur wanted to rebuild an airplane hangar which collapsed last winter due to snow buildup and he was disturbed that the City had been making this difficult. He does not favor governmental restrictions on activities in the flood plain.

The Daily Hampshire Gazette in its June 8, 1978, edition reported the sale of the airport, including its five hangars, office and utility buildings, to a group of four Connecticut businessmen who are also aviation enthusiasts. Mr. Welton Maynard, who is to be responsible for day-to-day operation of the facility, was reported to have stated that the group does not plan any immediate changes. They are considering installing a restaurant, increasing aircraft sales, and perhaps trying to reactivate the airport's seaplane license. Expansion of the field to accommodate larger aircraft is not anticipated. (At present some 60 small planes are based there.) Any "changes and improvements" would be done gradually.

Ox-Bow Marina

The people contacted at the Marina indicated that this new facility had been constructed at its present location due to heavy flooding at the old location across the Ox-Bow. Flooding at the old site was an annual event which caused a great deal of inconvenience.

The new structure is elevated above the level of Route 5 and the level of much of Northampton. The owners believe that it is very safe from flood hazard. There are a few days each spring when Island Road, the only access road, becomes impassable, but this is not seen as a significant problem.

The owners are aware of the regulations and restrictions in the flood plain, but believe that they are a minor factor for the firm.

Packaging Corporation of America (Tri-City Container Plant)

During the interview with Mr. Eli Kwartler, the Plant Manager, he indicated that there had never been any damage due to flooding in the 15-year history of operations of the plant. Although the plant has no special construction or flood hazard protection, the owners do carry \$100,000 in flood insurance. This amount, however, is small relative to the value of the inventory of paper products which could

be lost, and would not begin to cover the value of machinery in the plant.

Mr. Kwartler was uninformed about flood plain restrictions and regulations. He was not concerned about future construction restrictions due to the recent expansion of the plant to what is considered an optimal production size.

Colonial Hilton Inn

The manager of the Colonial Hilton, Mr. George Paige, said that the Inn had never experienced any damage or loss of business due to flooding since its opening in 1969. The facility was constructed on an elevated site which is not subject to flooding. In addition, the Inn was built on a slab and, therefore, has no problem with water in basement areas. The owners do not expect flood damage and do not carry flood insurance.

Mr. Paige was concerned about the zoning of the area and the restrictions placed on new construction. The Inn owns another 90 acres adjacent to the I-91 interchange and has had a number of firms interested in purchasing it for commercial development. The existing zoning, however, would prevent commercial development, resulting in a lower value on the land and preventing the firm from realizing a good return on the investment. He objects to the restrictions.

General Conclusions

First, most firms did not foresee any real threat from a flood. Many managers or owners pointed to a long history of doing business at their present locations without any loss of property or days of operation. As a result, most of the firms interviewed do not carry flood insurance; if they do, it is a small amount relative to the value of the property.

Second, most business representatives were not very familiar with regulations concerning the flood plain. If they were aware of regulations, it was as a result of a negative experience. In general, business people interviewed were against government regulation per se and restrictions on their activities in the flood plain in particular. They expressed opposition to government interference with their right to assess and take risks, believing that the government's assessment of risks is overly pessimistic.

Finally, some of the businesses had taken precautions during construction of their facilities to protect against water damage from a flood. The precautions usually took the form of filling land to a higher elevation than the surrounding area and highways. In some cases equipment such as pumps is available to minimize damage.

C. Institutional Flood Plain Occupants

Representatives of six institutional owners of land bordering the Mill or Connecticut Rivers were interviewed. (Locations are indicated on Figure 10, p. 121.) Each was asked to comment on the magnitude of existing flood problems, the adequacy of protection provided by flood control structures, experience (if any) with flood plain regulations, plans for future land use which might result in involvement with regulatory procedures and restrictions on construction, and general attitude toward river and flood plain issues. The following paragraphs summarize their comments.

Northampton Country Club

The Northampton Country Club provides golf and swimming facilities for its members at a site adjacent to the Mill River. Mr. Donald J. O'Brien, President, stated that normal flooding causes relatively minor damage to club property. A portion of the golf course is subject to inundation in the spring and, therefore, requires some extra repair and maintenance after the water has receded. A small wooden bridge leading to an island used as a tee area has to be replaced almost every year because of damage from floating chunks of ice. However, Mr. O'Brien expressed satisfaction with protection afforded by existing flood control structures. He was uncertain about the exact boundary of the regulated area but thought that only a few small buildings were located within the boundary. These include a snack shed, a maintenance shed, and possibly one or two other minor structures. The club has no significant construction plans for the future and does not expect to come into conflict with flood plain controls.

Speaking as an individual, not as a club officer, Mr. O'Brien expressed approval of the idea of flood plain zoning. He thinks development should be kept out of the flood plain, especially when conversion of agricultural land to other uses would occur. He also feels that people who choose to build houses and live on the flood plain may not be aware of the risk they are taking. He is concerned that a planned sewer line in the Mill River valley will stimulate more construction and conversion of agricultural land. He is also concerned about the rundown condition of the several small dams along the Mill River. One, at Arch Street in Leeds, is located only a short distance upstream from the clubhouse. If this dam gave way, the clubhouse might be damaged. Mr. O'Brien thinks that repairs and proper maintenance of the dams, if done at all, are most likely to be undertaken by private industries that might use them to generate electricity.

Look Memorial Park

Look Park, created in 1930, offers to the public a variety of outdoor recreation facilities including ball fields, tennis courts, a

swimming pool, paddle boats, a miniature train ride, and picnic areas. According to Mr. Brian Elliott, Park Superintendent, the park is now fully designed and built. The only anticipated changes of any significance are rebuilding tennis courts and possibly adding another comfort station. Otherwise, construction activity will be limited to normal maintenance. The park carries no flood insurance because the major buildings are not located in flood hazard areas. (One building got wet during the 1938 flood, but no real damage was done.) He considers the picnic facilities and other small recreational structures to be compatible flood plain uses and too minor to insure. Flood damage to them is taken care of as normal operation and maintenance work. Since there are no plans for building in the flood plain, he does not expect the park to be troubled by flood plain regulations.

Mr. Elliott regrets the occasional loss of riverside trees which results from flooding, but accepts this as a normal part of flood plain dynamics. Because he values the natural regimen of the river system, he is dubious about Soil Conservation Service proposals to build small upstream dams to permit augmentation of water flow during periods of low flow.

The park trust that controls the park is also responsible for Cook's Dam at Arch Street in Leeds. The trustees are not anxious to keep the dam because of a possible serious drain on park funds for maintenance. (The park's only sources of revenue are income from the trust, gifts, and user fees.) The trustees would probably be willing to turn the dam over to the City of Northampton for use as part of a power generating system or series of facilities.

Northampton State Hospital

Northampton State Hospital consists of a complex of patient care and support structures owned and operated by the Commonwealth of Massachusetts. Mr. Richard Gold, State Hospital Steward, does not anticipate any conflicts with flood plain zoning restrictions because the existing major buildings are at elevations well above the 100 year flood area and because no additions to the facilities are planned. The buildings are also beyond the 500 year flood zone as advocated in Executive Order 11988 (1977). There is a small group of hospital-owned employee houses just north of West Street and west of the Mill River. Five of these are within the 500 year flood zone; one is inside the 100 year flood zone. None of the hospital's buildings is insured by an outside agent because this function is handled under the state's own self-insurance plan.

Mr. Gold expressed general satisfaction with the protection provided by existing flood control structures. He is aware of discussions with Smith College (located just across the river from the hospital) concerning the possibility of undertaking a joint project to generate electricity using a dam in the immediate vicinity. However, this is only under consideration and the hospital has not submitted any proposals for capital expenditures.

It is Mr. Gold's personal opinion that flood plain zoning regulations could be applied too harshly. For example, in some places industry might be prevented from expansion which could benefit the city's economy.

Smith College

Smith College owns extensive frontage along the Mill River. Mr. Philip Reid, Assistant to the President, indicated that the only college buildings in the flood plain are boat houses, a field house, and possibly a physical plant building which supplies heat for the college buildings. The boat houses have to be close to the river in order to be functional. This high risk location is accepted as necessary. (A boat house was damaged by large chunks of river ice in 1978.) Mr. Reid was not certain whether the physical plant building is actually in a regulated area. In any case, the only substantial changes to it would result from possible conversion from fuel oil to coal, or from the electricity generating project under discussion with Northampton State Hospital, mentioned above. Any future requirement for structural treatment for flood proofing of the building would almost certainly entail a great deal of expense. With these potential exceptions, he anticipates no problems with flood plain regulations and none have been experienced in the past. Smith College has no plans for locating other buildings in the flood plain.

Mr. Reid believes that present dam and dike works provide adequate flood protection. He believes that a great deal of thought and planning have gone into these structures and other flood preparations and that they are adequate to handle anything but a massive catastrophe which would be beyond human control in any event.

Other uses of flood plain areas are for recreation, especially athletic fields and ice skating at Paradise Pond, and for natural history field studies. He regrets, but is resigned to, disruption of a study area which will result from installation of the new sewer line.

Three County Fair Association

The Fair Association has been active at its location near the Connecticut River since the turn of this century. Its primary purpose is to organize and provide facilities for agriculture-related events. Its property is also used in the summer for horse racing (ten permitted racing days per year around Labor Day) and a variety of weekend exhibits and events. According to Mr. Almer Huntley, Association Vice-President, the annual agricultural fair held on Labor Day weekend is the largest single event, drawing some 35,000 to 40,000 people per day. Other activities attract a few hundred to a few thousand people.

Serious flooding experienced at the fairgrounds happened in 1936 and especially in 1938. Some flooding also occurred in 1955.

The fairgrounds are in a natural backwater area where strong flood currents are not experienced. Construction of I-91 has accentuated this condition since the roadway acts as a barrier between the normal river channel and the fairgrounds. Mr. Huntley said that flood water simply rises and falls without doing any real damage to the buildings. As long as the barns, grandstand, and other structures remain attached to the ground (and they always have) no harm is done. The Association does not carry flood insurance because they do not care if the structures get wet and their machinery can easily be driven away from the site if necessary.

The fairgrounds are within the regulated flood zone. The 100 year flood elevation at that location is approximately 125 feet and the grounds are at 118 to 121 feet. Recently proposed regulations would have required that new buildings be flood proofed. However, a decision to treat the structures as accessory agricultural buildings makes flood proofing unnecessary.

The Association would like to add a covered arena to be able to attract events such as horse and antique automobile shows. This would, Mr. Huntley feels, benefit the community as a whole. Plans for the building recently became entangled with a proposal to build a state-financed skating rink on fairground land, with use for a few specified Fair Association events guaranteed. The rink is generally considered a desirable recreational facility for the area, but there are doubts about whether the fairground location is appropriate. In terms of proximity to major roads and the availability of existing parking space, it is a good site. However, some people think it would be poor policy for the state to pay for a building in a flood hazard area while at the same time trying to discourage flood plain development. Perhaps the most vociferous local objections come from neighboring residents who already resent traffic, streets clogged with parked cars, littering, noise, and other problems incidental to fairground activities. Mr. Huntley claims that the parking situation is often caused by people using the adjacent ballfield, and that additional land recently acquired by the Association is now available for use by those people. Further, the Association, assisted by the Police Department, does its best to control traffic and parking. If the Association decides to go ahead independently with its own arena plans, Mr. Huntley does not foresee any serious difficulty in obtaining the necessary city permits despite anticipated objections from some environmentalists.

Arcadia Wildlife Sanctuary

Arcadia Wildlife Sanctuary is a 475-acre tract of land located along the Connecticut River. About 80% of the area is in Northampton and the remainder, including the buildings, is in neighboring Easthampton. The sanctuary is owned by the Massachusetts Audubon Society. The director of the sanctuary, Mrs. Judith Hubley, reports that about 10,000 visitors per year use the facility. Users include pupils at a

nursery school conducted there; school groups, senior citizens and other organization members who are taken on guided tours; and people who make informal use of the property for a variety of leisure time activities.

The function and ecological value of the flood plain are important components in the educational program. In addition to on-site explanations, films are used to show the value of the flood plain. Mrs. Hubley states that even the nursery school children acquire a basic understanding of what the flood plain is and does. She heartily approves of Northampton's efforts to regulate flood plain use.

The sanctuary's buildings include a house built c. 1840 and a nature center built five years ago. Both are close to, but not actually in, the 100 year flood zone. (The house was not flooded in 1936 or 1938.) There are no plans to locate any future buildings in the flood plain because this would be contrary to the organization's philosophy of preserving flood plain land to serve as an integral part of the natural water/land regime.

General Conclusions

For the most part, flood plain occupants in this category have no objection to flood plain zoning regulations, if only because they do not expect to be hindered by them. The Fair Association is an exception and also presents exceptional circumstances with respect to the types of structures and activities under its control. Some institutional occupants definitely favor the purposes and application of flood plain zoning restrictions and support the city's efforts in this regard.

D. Local Organization Representatives

Persons in leadership positions in seven local organizations were contacted to find out if their organizations had shown any interest in recent years in flooding and related issues, particularly in respect to flood plain use and control. Such interest might have been expressed in ways such as inviting a speaker to appear at a meeting, having a study committee, or perhaps adopting a policy position for the organization. In addition, each person contacted was asked his/her own opinions about flood damage control measures--opinions which were not connected in any way with their roles as organization members.

The purposes of the interviews were to learn whether the subject seemed significant enough to have attracted the attention of the organizations and, if so, what was thought of the subject; and to learn the opinions of a few people whose positions were evidence of willingness to participate in group activities to a greater degree than

most. The selection of groups to be contacted was not in any way scientific. Organization names were simply chosen from a list of general membership groups in Northampton whose interests might be broad enough to include flood management issues. The organizations and individuals are as follows:

Business and Professional Women's Club: Irene David, President

Chamber of Commerce: James Foley, President; Paul Walker, Executive Director

Florence Civic and Business Association: Alvah Brown, President (1977-1978)

League of Women Voters of Northampton: Lisa Ferre, Natural Resources Chairman (1977-1978); Eleanor Lincoln, former Natural Resources Chairman

Lions Club: Kenneth Parent, President (1978-1979)

Northampton Woman's Club: Margaret O'Donnell, President

Rotary Club: Robert Borawski, President (1977-1978)

None of these organizations had been involved recently with flood management issues. The Business and Professional Women's Club did have a meeting concerning the Metropolitan District Commission's proposal to divert Connecticut River water through pumped storage facilities at Northfield to the Quabbin Reservoir.

Mr. Foley and Mr. Walker reported that the Chamber of Commerce has no policy on flood control. Mr. Foley noted that in the years he had been associated with the Chamber, the subject of flood plain management had not come up formally or informally with the group as a whole or in any committee or study group.

Ms. Ferre reported that the Northampton League of Women Voters had been studying the Northfield diversion project but had not considered flood plain issues per se. Since League rules do not permit the organization to adopt a formal policy without first studying the issues involved, she was unable to state any opinion for the organization. She did mention that some members had been active in flood plain matters as individuals.

All of these organizations have at least occasional speakers on topics of general interest. Two representatives suggested that flood management issues might be a good subject for a future meeting.

Personal Opinions

The following summary of individuals' opinions shows a wide array of personal beliefs and marked differences in the interest they happened to have in flooding.

Two persons were not familiar with the issues of flood management and therefore had unformed attitudes. One of these was aware of Pyramid's purchase of flood plain land and would not be surprised to see another shopping mall which Northampton does not need and which should not be placed in the flood plain in any event.

One person was opposed to flood plain regulation on the grounds that there are already too many rules and regulations restricting people's freedom of action, consuming too much time and effort, and slowing down economic progress.

In contrast, another person strongly favored flood plain zoning, expressing these opinions: We should learn to live with floods, allowing rivers to carry on their natural functions. No more dams, large or small, should be built. Flood plain zoning is definitely a step in the right direction, but flood proofing requirements do not seem useful. Filling will result in undesirable erosion of the fill, and raising buildings on stilts could be unsafe because of erosion around the pilings. Relocation of flood plain occupants would be the best solution except for the expense and personal hardships involved. Ruined or heavily damaged buildings should not be rebuilt as happened after the 1978 winter storm north of Boston. The proposed skating rink at the Fairgrounds seems an appropriate use for that area since it is in no sense a "natural" area and the building could probably be designed to withstand flooding there just as the existing Fair buildings do.

A person who opposed construction of more dams or raising the Northampton dikes compared his feeling that protection against a 100 year flood is sufficient to buying insurance protection. That is, it is not possible to buy protection against every eventuality. It is better to have a reasonable amount of protection and go on to other things. Further, the Corps of Engineers is too intent on perpetuating itself and is consequently always "dreaming up new projects." Flood plain zoning is less expensive and a better long-term solution. The flood insurance program is good because people need the protection. Relocation is a desirable goal, but it should be accomplished through attrition. Existing structures could be purchased as they deteriorate or suffer flood damage, using money that would otherwise be spent on dams to buy the properties. Then suitable lands could be returned to agricultural use.

Another individual, who thinks existing structural protection is adequate, remembers the floods of the 1930's and has noticed a big

improvement in flooding conditions since then. Flood plain zoning is an acceptable flood management approach, and the insurance program is good because people need the protection it offers. Further development in areas such as along Route 5 is acceptable so long as adequate flood proofing is done. Relocation of flood plain occupants should not be undertaken by the government because people are there by choice, and they know what the risks are.

One other person also thought existing structural protection is sufficient, but with the caveat that the structures must be properly maintained. Having spent many years near the Mill River, this person is aware that people develop a sense of when to move away from the river and understands why they do not necessarily leave just because of a flood warning. The effects of the 1936 flood on Northampton would probably be much different today because the ice jam would be dynamited so as to eliminate the backup of water. Flood plain zoning is sometimes carried to extremes, as is the case in the Spring Street area of Florence. The land there only floods every twenty years or so; people should be allowed to live there and make use of their property. Land use restrictions are a hardship for people who cannot fully use their property but have to pay high taxes anyway. With respect to a program of relocation, taxpayers will have to pay for the properties purchased by government. A similar objection applies to the insurance program; taxpayers are charged with the cost of the subsidy.

Conclusions

This group of contacts with organization leaders provides evidence in support of the hypothesis that there is to a considerable extent a politically neutral attitude toward flood management issues. The subject does not seem to be in the public consciousness enough or to be sufficiently important at this time and in relation to other priorities to prompt some form of group response. Most of the officers had fairly strong opinions about flood management, but these are separate from their organizational associations.

IV. DISCUSSION OF FINDINGS

In this chapter, some general conclusions based on the research findings are drawn and then related to theories concerning reactions to remote hazards. The political acceptability of structural and non-structural approaches to flood hazard management is evaluated. And finally, comments on the study itself are made.

A. General Conclusions

1. Survey Data

Results of the survey of flood plain and Northampton residents indicate both groups perceive flooding as hazardous. While there are differences in opinion about how much water constitutes a flood, there is general agreement that there have been no really bad floods since the late 1930's or 1950's. This implies that flooding is a remote hazard; that respondents tended to see past flooding as worse than present risks supports this notion. In addition, memory of dangers encountered in past floods may have faded with the years. Northampton was in a state of disaster during the floods of the 1950's and 1930's, yet few respondents admitted having suffered any financial loss or personal injury to themselves or their families. In other words, it is very possible that the big floods have become romanticized and people have forgotten some of the seriousness of flood hazard.

In general, the flood plain residents are significantly more critical of non-structural flood hazard mitigation measures, although the pattern of their attitudes toward individual alternatives is similar to that of the general population. Also, the knowledge of flood plain residents about flood hazard control measures is greater than that of the Northampton sample. In both cases, the difference is probably due at least partly to the greater immediacy of flood danger to the flood plain residents.

The division of flood hazard mitigation measures into structural and non-structural categories (with the possible addition of a "do nothing" or no action category) seems to have intuitive meaning to the respondents. This suggests a capacity on the part of the public to evaluate policies within the frame of reference of the structural versus non-structural dichotomy.

The fact that people seemed to distinguish intuitively between structural and non-structural measures does not support any conclusion as to whether one or the other type is more preferred. It is more meaningful to say that people support and have confidence in the methods

with which they are most familiar and, by inference, those which have been adopted in Northampton. Among the non-structural alternatives, knowledge and confidence were relatively high for flood plain zoning and insurance, relatively low for flood proofing and types of public purchase. Among all alternatives, knowledge and confidence were high for dams, dikes and flood warning and evacuation--methods of long-standing use.

2. Informal Interviews

Support among state and federal officials for non-structural management was very strong, and especially so for restricting flood plain development and reducing existing hazard potential through attrition. Other possible benefits from flood plain use restrictions were noted, such as preservation of agriculture, public access to the river banks for recreation and protection of wetlands and wildlife habitat. Although officially supported, the insurance program was suspected of attracting people to flood plain areas because of the financial security it affords. The main objection to flood plain zoning centered on the additional burden its regulations and permit processes place on potential industries that might be discouraged from locating in the state. However, the generally agreed on goal was clearance of hazard areas and restoration of flood storage capacity in the long run.

Local officials were overwhelmingly committed to non-structural approaches, again emphasizing zoning and with a tentative acceptance of clearance by attrition. There was also notable confidence in existing emergency plans. These are recognized as essential in humanitarian terms but not effective in terms of the basic problem of preventing damage by keeping development out of the way of future harm. Experiences of council members indicated a general lack of concern about flood management among their constituents except as it related to other issues.

It is interesting to note that acceptance of continuing long-range planning responsibilities was high among policy-making government officials who, by the nature of their work, must deal regularly with future events.

Flood plain businesses and other institutions tended to be neutral or favorable toward the zoning so long as they perceived no threat to plans for their individual futures. Awareness of the regulations and issues seemed to be related to the immediacy of effects on plans or on general knowledge and concern with flood plain issues inherent in the nature of the institution (as for example with Arcadia Sanctuary). For the local organizations, flood plain issues seemed to be dormant.

All of the above generalizations lend credence to the idea that familiarity and salience (in the sense of importance and strikingness) are related.

B. Remote Hazards

Given that floods are remote hazards, it is instructive to consider how and why people react to such hazards the way they seem to do. Kunreuther (1978) recently reviewed the results of several studies investigating individuals' reactions to a variety of extremely hazardous but unlikely events. His analysis suggests that the decisions people make about such events are not based on simple, rational models of decision making. For example, it is well known that use of automobile seat belts reduces the risk of motor vehicle related fatalities, yet for most trips people do not use seat belts. Another extremely well publicized hazard is smoking, yet people continue to smoke. Also, flight insurance has a very high premium-to-risk ratio compared to life insurance, yet flight insurance, though a "poor buy," continues to be extremely popular.

Kunreuther offers several explanations for these apparently anomalous behavior patterns. First, people seem to equate greater hazard with extended exposure. Thus, seat belts are used more on long drives at high speeds. Second, people tend to discount future consequences very heavily in comparison to present benefits. They are more likely to insure against a hazard if the investment is low, as with flight insurance. Third, people are more likely to insure against a hazard which has recently struck a close friend or relative. All of these factors point to the conclusion that people do not deal with dangerous but unlikely events according to a rational model of decision making based on evaluation of available information. Instead, decisions are heavily influenced by the perceived immediacy of the hazard in relation to current or short-term costs.

These observations concerning remote hazards fit generally very well with the information gained in the research for this study. People in Northampton are seldom exposed to floods. The immediacy of risk is not enforced by experiences of friends and neighbors because they too are seldom exposed to floods. And the likelihood of a serious flood occurring may be seen as so far in the future that the discounting of future costs leaves little to balance against current benefits. (When most people speak of the risk of a 100 year flood, do they seriously think of it happening this week or this year?) Consequently, it should not seem surprising that so many people are unconcerned with flood control issues and that they do not feel moved to inform themselves about the issues.

C. Political Acceptability

The political acceptability of non-structural flood management approaches may also be evaluated in terms of reactions to remote hazards. The apparent background of neutrality is explainable in terms of remoteness of hazard. The acceptance by policy makers of planned actions taking place over an extended period of time results from their familiarity with dealing in future events--a familiarity which lends immediacy to the planning process for them. The opposition to regulation, particularly by some flood plain businesses and residents, relates in part to conflict with their immediately perceived short-term interests. Furthermore, the fact that flood plain zoning becomes part of the complex sets of issues relating to street congestion and neighborhood quality, as in the Ox-Bow and Fairgrounds areas, has more to do with the immediacy of the other issues than with flood plain zoning itself. The projected caution in approaching relocation may also serve to decrease opposition to the application of the policy if and when it occurs.

It seems eminently reasonable to conclude that flood plain zoning and the insurance program will continue to be acceptable to, or at least not actively opposed by, substantial majorities of all groups of people interviewed for this study, and the approaches will remain uncontroversial except under the following circumstances.

- 1) If the controls are not enforced vigorously so as to gradually produce the desired results, active proponents can be expected to object strenuously, bringing the issue of enforcement to public attention.
- 2) If zoning controls are drawn into debate over another important issue, the equity and reasonableness of flood plain zoning will probably be challenged. The most likely source of such controversy is competition for land for developed uses in the event of an unexpected large surge in economic activity and population.
- 3) In the aftermath of a flood disaster, the principle of relying on land use controls to deter flood risk will almost certainly be severely questioned. The argument would be carried back to the fundamental issue of structural versus non-structural controls.

D. This Study

In survey research, it is regrettable but not uncommon to discover too late that topics for questions have not been included that might have produced interesting and useful results. In this study, it was felt that questions concerning respondents' knowledge of what exists in the Northampton flood plain would have provided interesting insights

into people's background of understanding of flood plain conditions and issues. Respondents might have been asked to name or choose from alternatives the most important present use of flood plain land, with other questions dealing with the suitability and desirability of types of uses.

With respect to future government actions in flood plain management, the study findings suggest that more effective ways of communicating information about proposed or newly implemented programs should be found. If this is possible, it could reduce misunderstandings and unnecessary anxieties on the part of affected citizens. Furthermore, such a change in knowledge would represent a change in the conditions in which zoning, insurance, or other programs take place. The functioning of the programs and processes might be made smoother and more effective.

Finally, the consultants believe that the interviewing process has been educational for some respondents and has served to increase the awareness of some people toward flood management issues. These are considered to be beneficial side effects.

APPENDIX A

SUPPLEMENTARY ECONOMIC DATA

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Table 1

Northampton Employment and Payrolls for All Industry

Industry	Number of Firms	1974 Annual Payroll	Avg. 1974 Employees	Percent Distribution by Employees
Agriculture & Mining	8	\$ 365,556	48	0.5%
Construction	60	3,336,327	313	3.2
Manufacturing	41	21,547,545	2,316	23.7
Trans., Comm., & Utilities	16	3,624,749	396	4.0
Wholesale & Retail Trade	239	17,441,528	2,989	30.5
Finance, Ins. & Real Estate	38	2,725,103	324	3.3
Service Ind.	<u>174</u>	<u>24,438,594</u>	<u>3,403</u>	<u>34.8</u>
TOTALS	576	\$ 873,479,402	9,789	100.0%

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Source: Massachusetts Division of Employment Security, Massachusetts Cities and Towns--Employment and Wages . . . (1977).

Table 2

Northampton Manufacturing Employment and Payrolls
by Standard Industrial Classification

S.I.C. Group	Number of Firms	1974 Annual Payroll	Avg. 1974 Employees	Percent Distribution by Employees
19. Ordnance & Accessories	-			
20. Food & Kindred Prod.	6	\$ 1,306,908	185	8.0%
21. Tobacco Mfg.	-			
22. Textile Mill Prod.	-			
23. Apparel & other Fin. Goods	-			
24. Lumber & Wood Prod.	4	441,843	44	1.9
25. Furniture & Fixtures	-			
26. Paper & Allied Prod.	3	1,575,927	182	7.9
27. Printing, Publ. & Allied	5	898,991	106	4.6
28. Chemicals & Allied	1 firm included in misc. mfg. ind.			
29. Prod. of Petroleum & Coal	3	296,792	40	1.7
30. Rubber Products	-			
31. Leather & Leather Prod.	-			
32. Stone, Clay & Glass Prod.	2 firms included in misc. mfg. ind.			
33. Primary Metal Industries	3	1,944,391	179	7.7
34. Fabr. Metal Products	3	812,978	107	4.6
35. Machinery (ex. electrical)	7	520,398	48	2.1
36. Electrical Machinery	-			
37. Transportation Equipment	-			
38. Prof., Scient. & Control. Inst. Photo., & Optical Goods, Watches & Clocks	1 firm included in misc. mfg. ind.			
39. Miscellaneous Mfg. Ind.	7	13,749,317	1,425	61.5
Totals	45	\$21,547,545	2,316	100.0%

Source: Massachusetts, Division of Employment Security, Massachusetts Cities and Towns--Employment and Wages . . . (1977).

Table 3

Industry of Employed Persons, 1970

	Northampton	Springfield SMSA	State Metropolitan Areas
Total Population	29,664	513,886	
Total Population Aged 16 Years +	11,622	206,262	1,963,176
% of Population Aged 16 Years +	39.18	40.13	

% of Employment in Each Industry

Agriculture, forestry, fisheries	1.2	.9	.7
Mining	.1	.1	.1
Construction	4.8	4.4	5.0
Manufacturing - Total	20.8	34.2	28.5
Furniture, lumber, wood products	.3	.4	.5
Primary metals	2.1	1.5	.7
Machinery, exc. electrical	1.5	4.4	3.2
Electrical machinery	.2	1.7	4.4
Transport equipment	.3	2.7	1.8
Other durable goods	6.0	4.1	3.3
Food & kindred products	1.1	1.1	1.2
Textiles and fabricated textiles	1.2	2.6	3.3
Printing, publishing-- allied industries	1.4	2.9	2.0
Other non-durable goods	4.7	7.4	.9
Chemical & allied products	2.1	1.7	4.9
Railroads, express service	.2	.3	.3
Trucking service, warehousing	.5	1.2	1.1
Other transportation	.6	.7	1.3
Communications	1.7	1.3	1.6
Utilities & sanitary services	.6	1.3	1.4
Wholesale trade	1.8	3.9	4.4
Food, bakery, dairy stores	2.6	2.9	2.8
Eating and drinking places	2.5	2.9	2.9
General merchandising retail	1.8	3.2	2.9
Motor vehicle retail and service stations	1.3	1.6	1.5
Other retail	5.5	5.6	5.6
Banking and credit agencies	.6	1.5	1.9
Insurance, real estate, financial	2.3	3.9	4.2
Business repair services	2.0	2.4	3.1

Table 3--Continued

	Northampton	Springfield SMSA	State Metropolitan Areas
Private household	.9	.6	.7
Other personal services	3.7	2.5	2.5
Entertainment and recreation	.4	.6	.6
Hospitals	10.9	4.2	4.7
Health except hospitals	2.1	2.0	2.5
Elementary, secondary and college - govt.	8.0	5.7	3.4
Elementary, secondary and college - private	12.3	2.9	
Other educational and kindred services	1.5	.5	.6
Welfare, religious, nonprofit org.	1.1	1.3	1.4
Legal, engineering and misc.	3.8	2.3	3.4
Public administration	3.7	4.5	5.3

Source: U.S. Census.

Table 4
Occupation of Employed Persons, 1970

	Northampton	Springfield SMSA	State Metropolitan Areas
Total Population	29,664	513,886	
Population 16 Years + --			
Civilian Labor Force	11,622	206,262	1,963,176
% in Occupational Category			
Professional, technical and kindred workers	19.4	14.3	17.6
Engineers	.8	1.4	2.1
Physicians, dentists and related practitioners	1.0	.7	.7
Health workers	3.7	2.0	2.2
Teachers, elementary, second.	3.8	3.6	3.3
Technicians, except health	1.4	1.2	1.4
Other professional	8.8	5.2	7.4
Managers, administrators, except farm	6.6	7.8	8.3
Salaried: Manufacturing	.6	1.5	1.6
Retail	1.2	1.8	1.6
Other	3.6	3.4	3.9
Self-employed: Retail	.5	.5	.5
Other	.6	.4	.5
Sales workers	6.1	7.4	7.2
Retail	3.3	4.2	4.0
Other	2.7	1.4	1.5
Clerical and kindred	18.2	18.7	20.7
Craftsmen, foremen and kindred	11.1	14.0	12.7
Automotive mechanics	.8	1.0	1.0
Mechanics, repairmen, not auto	1.3	1.8	1.5
Metal crafts	1.5	1.6	.9
Construction crafts	3.2	2.0	2.1
Other	4.3	5.8	5.3
Operatives, except transport	11.9	17.5	14.0
Durable goods manuf.	5.3	7.8	5.5
Nondurable goods manuf.	3.4	6.7	5.8
Non manuf. industries	3.1	2.9	2.6
Transport equipment operatives	2.2	3.1	3.0

Table 4--Continued

	Northampton	Springfield SMSA	State Metropolitan Areas
Laborers, except farm	3.1	3.4	3.4
Construction labor	.4	.6	.6
Freight, stock, material handler	1.1	1.5	1.5
Other laborers, except farm	1.5	1.4	1.2
Farmers and farm managers	.2	.3	.2
Farm labor and farm foremen	.3	.4	.2
Service workers, exc. private households	19.7	12.2	11.7
Cleaning service	3.9	2.5	2.3
Food service	6.5	3.9	3.7
Health service	4.0	1.6	1.8
Personal service	2.2	1.5	1.3
Protective service	1.1	1.6	1.7
Private household workers	.9	.5	.6

Source: U.S. Census.

Table 5

Payroll Comparisons: Northampton-Amherst-Hadley

	Total Annual Payroll	Number of Establishments	Total Employment (Average Annual)
NORTHAMPTON			
1967	40,869,000	562	7,878
1968	41,747,500	564	7,704
1969	41,546,200	553	7,220
1970	43,001,900	551	7,071
1971	41,053,800	553	6,551
1972	62,823,600	555	9,178
1973	70,083,100	579	9,566
1974	73,479,400	576	9,789
1975	75,353,600	586	9,373
AMHERST			
1967	6,147,200	188	1,434
1968	6,803,700	193	1,535
1969	7,572,400	208	1,668
1970	8,447,300	213	1,724
1971	9,213,300	234	1,767
1972	18,923,000	271	2,827
1973	21,997,900	296	3,224
1974	23,361,300	301	3,287
1975	19,487,100	307	2,787
HADLEY			
1967	1,958,700	78	536
1968	2,666,200	81	638
1969	2,650,300	83	640
1970	2,872,900	86	664
1971	3,328,200	86	677
1972	4,137,000	97	854
1973	5,682,200	107	1,293
1974	6,503,700	119	1,373
1975	6,738,300	135	1,392

Source: U.S. Census.

Table 6

Comparison of Northampton with Other Area Communities: Public Finance Data - 1978

		Northampton	Amherst	Hadley	W. Springfield	Westfield
Expenditures	\$000	17,439	13,003	2,464	17,043	20,998
Assessments	\$000	703	730	198	1,465	1,437
Amt. to Raise	\$000	18,491	13,850	2,763	18,749	22,735
Cherry Sheet	\$000	4,239	1,864	766	2,107	4,204
Local Receipts	\$000	2,418	2,295	269	2,092	2,650
Levy	\$000	10,264	7,634	1,306	13,487	14,838
Assessed Value	\$000	165,542	171,546	13,059	264,451	183,188
1977 Total Tax Rate		61.00	42.00	100.00	45.50	74.00
1978 School Tax Rate		34.66	28.26	52.46	24.17	44.25
1978 Total Tax Rate		62.00	44.50	100.00	51.00	81.00
Assessment Ratio		68	79	19	70	49
1978 Full Value Tax Rate		42.16	35.16	19.00	35.70	39.69

Source: Massachusetts Taxpayers Foundation, Inc., Municipal Financial Data (1978), pp. 5, 11, 17, 23.

APPENDIX B

SURVEY QUESTIONNAIRE AND GRAPHICS

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SURVEY QUESTIONNAIRE

ATTITUDES TOWARD IMPLEMENTATION OF
NON-STRUCTURAL FLOOD DAMAGE REDUCTION
TECHNIQUES, NORTHAMPTON, MASSACHUSETTS

[Note: Questions 52 through 69 were included for use in a separate study. Data from these questions was not used in this study. This copy of the questionnaire is complete except for the omission of survey management and coding mechanisms.]

RESPONDENT: _____ . DATE: _____ .

ADDRESS: _____ . TIME: _____ .

[CODE TIME BEGAN TO NEAREST HOUR ON A 24-HOUR CLOCK.]

(NOTE: "FP" is an abbreviation for "flood plain.")

INTRODUCTION

As I mentioned on the telephone, I am conducting this interview for the U.S. Army Corps of Engineers. They are one of the primary government agencies concerned with flood control in the Connecticut River Basin. In the past, the traditional way to reduce flood damage has been to build dams and dikes to control the flow of river water. More recently, other methods of limiting flood damage have been introduced which do not require large-scale construction projects. The Corps is conducting this survey because they are interested in what people think about the issues involved in managing flood damage, especially by means other than dams and dikes.

1. First of all, have you ever lived in a place where there was a flood?

1. Yes (GO TO Q. 2)

2. No (SKIP TO Q. 9)

8. Don't know (SKIP TO Q. 9)

2. Was this in the Northampton area?

1. Yes (GO TO Q. 3)

2. No (SKIP TO Q. 6)

8. Don't know (SKIP TO Q. 9)

3. During what year or years did you personally experience a flood in the Northampton area?

PROBE IF NECESSARY: Just your best estimate.

ENTER YEARS: _____

4. During which of these years was the worst flood? 19

5. CODE YEAR OF MOST RECENT FLOOD MENTIONED. 19

6. Did you or your family suffer any property losses as a result of any of these (this) flood(s)? (PROBE: By property we mean things like your house or car.)

1. Yes 2. No 8. Don't know

7. How about personal injuries? Were you or anyone in your family hurt as a result of any of these (this) flood(s)?

1. Yes 2. No 8. Don't know

8. And what about financial losses? Did you or anyone in your family lose wages or have a business which suffered because of any of these (this) flood(s)? (CLARIFICATION: Commercial crop damage is a business loss. Family garden patch does not count.)

1. Yes 2. No 8. Don't know

9. How serious a problem for the Northampton area do you think flooding has been in the past? Was it very serious, somewhat serious, not too serious, or not serious at all.

1. Very serious. 2. Somewhat serious 3. Not too serious
4. Not serious at all 8. Don't know

10. When there are floods various people stand to suffer financial loss--people who live in the flooded areas, farms or other businesses in the flooded area, other local merchants who lose business because of the flood, and the government which must repair damaged services and utilities. Which one of these do you think has been most severely affected by past floods in Northampton?

1. FP residents 2. FP businesses 3. Local merchants
4. Public services & utilities 8. Don't know

11. In your opinion, is the potential for flood damage in the Northampton area very serious, somewhat serious, not too serious, or not serious at all? (PROBE FOR FP: Take this house, for

instance, how serious do you think flood damage is likely to be here?)

1. Very serious 2. Somewhat serious 3. Not too serious
4. Not serious at all 8. Don't know

12. What one area of Northampton do you think would be most threatened by possible flood hazards?

RECORD RESPONSE _____
CODE AREA

1. Connecticut River 2. Mill River 8. Other, Don't know

13. Over the next ten years, what do you think are the chances that Northampton will experience a serious flood? On a scale from a 0% to a 100% chance, where would you place Northampton's chance of experiencing a serious flood within the next ten years? (PROBE: You know, which could cause anyone serious problems.)

ENTER % _____.

14. Suppose there were a serious flood in the Northampton area this year. When would you expect the next serious flood to be? (PROBE: Repeat capitalized phrases.)

1. SOON - since floods seem to happen in groups.
2. NOT FOR A WHILE - since floods occur according to a regular cycle.
3. CAN'T TELL - since floods can happen in any year.
4. THERE WON'T BE ANOTHER flood - because this area is already well protected.
8. Don't know.

- *15. One approach to controlling floods is through the construction of large structures such as dams and dikes. Dams are used to hold flood waters upstream so that downstream areas are protected. Do you know if dams are used to control floods in the Northampton area?

1. Yes 2. No 8. Don't understand, don't know

*(EXPLAIN DAMS WITH GRAPHICS)

- *16. Dikes are another kind of structure used to control floods. They are built along the river banks and allow flood waters to flow downstream, but confine them in the main river channel. Do you know whether dikes are being used to control flooding in the Northampton area?

1. Yes 2. No 8. Don't understand, don't know

*(EXPLAIN DIKES, RIVER CHANNELS AND FLOOD PLAINS WITH GRAPHICS)

Now I would like to ask for your personal opinion about dams and dikes.

17. How well do you think dams work as a way to protect people and property from flood damage? Are they very effective, somewhat effective, somewhat ineffective, or very ineffective? RECORD ANSWER BELOW Q. 18.

18. And how well do you think dikes work? Are they very effective, somewhat effective, somewhat ineffective, or very ineffective?

	Very Effective	Somewhat Effective	Somewhat Ineffective	Very Ineffective	Don't Know
DAMS	1.	2.	3.	4.	8.
DIKES	1.	2.	3.	4.	8.

19. What is your personal opinion about using dams. Should they be used to control flooding in the Northampton area? Are you strongly in favor of their use, somewhat in favor, somewhat opposed, or strongly opposed to their use? RECORD ANSWER BELOW Q. 20.

20. And what about dikes? Are you strongly in favor of their use, somewhat in favor, somewhat opposed, or strongly opposed to their use in the Northampton area?

	Strongly in Favor	Somewhat in Favor	Somewhat Opposed	Very Opposed	Don't Know
DAMS	1.	2.	3.	4.	8.
DIKES	1.	2.	3.	4.	8.

Now I would like to discuss with you some protective measures that could be taken long in advance that might lessen the potential damage and injury from future floods around here. I want to discuss several methods with you. You may have heard about some of them. They may not all be used in Northampton or even in Massachusetts. However, I would like you to go through them all with me anyway and just let me know if you have heard about them, and what you think of each one.

21. For instance, have you heard anything about flood plain zoning?

1. Yes 2. No 8. Don't know

- *22. Flood plain zoning laws are enacted by some towns for the purpose of regulating the use of land and structures in order to reduce flood damage potential. These regulations may be used to restrict construction on the flood plain which is likely to be damaged by floods. Have you ever heard any discussion about laws of this type?

1. Yes 2. No 8. Don't know

*(EXPLAIN FLOOD PLAIN ZONING WITH GRAPHICS)

23. What is your personal opinion about using flood plain zoning laws in the Northampton area? Are you strongly in favor, somewhat in favor, somewhat opposed, or strongly opposed?

1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know or don't understand

24. How well do you think flood plain zoning would work in the Northampton area as a way to reduce future flood damage? Would it be very effective, somewhat effective, not too effective, or very ineffective?

1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know or don't understand

25. Some people have protected their buildings by flood proofing them. Have you ever heard of this?

1. Yes 2. No 8. Don't know

- *26. Buildings are flood proofed through structural modifications such as raising foundations above the flood plain, fitting watertight doors, or installing special window shields. Have you ever heard discussions of any measures like these?

1. Yes 2. No 8. Don't know

*(EXPLAIN FLOOD PROOFING WITH GRAPHICS)

27. What is your personal opinion about using flood proofing as a way to lessen flood damage--are you strongly in favor, somewhat in favor, somewhat opposed or strongly opposed?

1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

28. How well do you think flood proofing works as a method to reduce flood damage? Is it very effective, somewhat effective, not too effective, or very ineffective?

1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know

29. Have you heard anything about the government's flood insurance program?

1. Yes 2. No 8. Don't know

30. The idea behind the program is that the federal government will subsidize flood insurance for property owners in flood areas if, in return, local communities agree to establish policies which place restrictions on further construction or development in those areas. Also, new construction in flood-prone areas has to include certain flood proofing measures. The purpose of the program is to reduce future flood damage. Have you ever heard anything about a program like this?

1. Yes 2. No 8. Don't know

31. What is your personal opinion about using the Federal Flood Insurance Program in the Northampton area? Are you strongly in favor, somewhat in favor, somewhat opposed, or strongly opposed to the program?

1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

32. For the Northampton area, how well do you think the Flood Insurance Program along with its required regulations work to control development and construction in flood hazard areas? Are they very effective, somewhat effective, not too effective, or very ineffective?

1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know

33. One sure way to control development in flood hazard areas is to actually buy property within the flood plain. Have you ever heard any talk about using outright purchase as a way to control the amount of damage that a flood could cause?

1. Yes 2. No 8. Don't know

34. The idea is very simple. If the government purchased at a fair price property which might be severely damaged by a flood, people

could then afford to move off the flood plain. Once the government had helped people move, the buildings could be taken down and the land put to some use which would not be so susceptible to expensive flood damage--maybe a park or for agriculture. Have you ever heard talk about doing this type of thing?

1. Yes 2. No 8. Don't know

35. If the government is willing to pay a fair market price for property on the flood plain, and to pay the expenses for moving the people who live there, do you think it is right for people to be required to sell their property and move?

1. Yes 2. No 3. Depends (specify) 8. Don't know

* * * (ASK OF FLOOD PLAIN SAMPLE ONLY)

36. If the government offered you a fair market price for what you own on the flood plain, and paid your moving expenses, would you be willing to sell?

1. Yes 2. No 3. Depends (specify) 8. Don't know

37. Now I would like to ask you for your personal opinion about outright purchase as a way to lessen flood damage in the Northampton area. Are you strongly in favor, somewhat in favor, somewhat opposed or strongly opposed?

1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

38. How well do you think purchasing land would work as a way to reduce flood damage in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?

1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know

39. There are other ways to acquire some rights to land without buying it outright. For instance, have you ever heard of transferring development rights?

1. Yes 2. No 8. Don't know

40. How about purchasing conservation easements?

1. Yes 2. No 8. Don't know

41. For land which is not highly developed, the owner can sell just the right to develop the land. In this way, restrictions may be placed on the types of future development or uses of the land which might affect flood levels, but the owner of the land still retains all the other rights associated with ownership. For example, he could go right on living or farming there just as he had been. Have you ever heard any discussion of something like this?
1. Yes 2. No 8. Don't know
42. What is your opinion of using this type of partial sale of property rights in the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know
43. How well do you think sales of this type would work as a way to reduce flood damage in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?
1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know
44. Have you ever heard about a flood warning and evacuation program?
1. Yes 2. No 8. Don't know
45. The government monitors rain intensity and river flow in order to provide warning when potential flood conditions might occur. If a flood seems imminent, state and local organizations can issue warnings and provide assistance so that residents can move themselves and some of their belongings away from flood danger. Emergency centers are also provided for people who have been flooded out. Have you ever heard about a program like this?
1. Yes 2. No 8. Don't know
46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

42. What is your opinion of using this type of partial sale of property rights in the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know
43. How well do you think sales of this type would work as a way to reduce flood damage in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?
1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know
44. Have you ever heard about a flood warning and evacuation program?
1. Yes 2. No 8. Don't know
45. The government monitors rain intensity and river flow in order to provide warning when potential flood conditions might occur. If a flood seems imminent, state and local organizations can issue warnings and provide assistance so that residents can move themselves and some of their belongings away from flood danger. Emergency centers are also provided for people who have been flooded out. Have you ever heard about a program like this?
1. Yes 2. No 8. Don't know
46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

43. How well do you think sales of this type would work as a way to reduce flood damage in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?
1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know
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1. Yes 2. No 8. Don't know
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1. Yes 2. No 8. Don't know
46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know


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1. Yes 2. No 8. Don't know
46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

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1. Yes 2. No 8. Don't know
46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

46. What is your opinion about using this type of program for the Northampton area? Are you strongly in favor of it, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know

47. How well do you think a flood warning and evacuation program would work to reduce economic and personal hardships due to flood damage in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?
1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know
48. Have you ever heard about flood disaster relief?
1. Yes 2. No 8. Don't know
49. After a very serious flood which damages a lot of property and may injure many people, the government may declare the area to be a "disaster." This official declaration qualifies the area for special disaster relief such as emergency food, medical aid, temporary shelter and additional manpower to help get things back to normal again. In addition, people who have lost property may be eligible for special financial assistance such as low interest loans. Have you ever heard about this sort of thing?
1. Yes 2. No 8. Don't know
50. What would your personal opinion be about declaring the Northampton flood plain a disaster area after a truly serious flood? Would you be strongly in favor, somewhat in favor, somewhat opposed, or strongly opposed?
1. Strongly in favor 2. Somewhat in favor 3. Somewhat opposed
4. Strongly opposed 8. Don't know
51. How well do you think providing disaster relief would work as a way to alleviate the effects of a serious flood in the Northampton area? Would it be very effective, somewhat effective, not too effective, or very ineffective?
1. Very effective 2. Somewhat effective 3. Not too effective
4. Very ineffective 8. Don't know

* * * (ASK OF FLOOD PLAIN SAMPLE ONLY)

52. When people think about the effects of the kinds of flood management techniques we've been talking about, they think of these effects in several ways. Some of the effects are social and emotional. For example, increases or decreases in personal safety, confidence and security, inconvenience, disruption of style of life, freedom of action, and pleasure from the environment. These are just examples and I'm sure you can think of
- 

* * * (ASK OF FLOOD PLAIN SAMPLE ONLY)

others. On balance, when you think of the social and emotional effects of dams on you, do you think of them as mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

53. Other effects are thought of as "economic." For example, the costs of building alterations, gains or losses in property value, increases or decreases in taxes, damage to property, and compensation for damages. What about the economic effects of dams on you? Are they mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

54. What about dikes? Do the social and emotional effects such as safety, confidence, inconvenience, life style, freedom of action and enjoyment of the environment seem to you mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

55. What about the economic effects like property values, taxes and damages. Do you think the economic effects on you of dikes are mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

56. How about flood plain zoning? Are your feelings about the social and emotional effects on you mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

57. What would you consider the economic effects of flood plain zoning on you to be? Mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

58. Flood proofing of buildings is another technique we talked about before. Do you think of the social and emotional effects on you as mostly positive or mostly negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

59. How about the economic effects of flood proofing on you?

1. Positive 2. Negative 7. Neutral 8. Don't know



* * * (ASK OF FLOOD PLAIN SAMPLE ONLY)

60. What about the flood insurance program? Are your feelings about the social and emotional effects such as safety and security mostly positive or mostly negative?
1. Positive 2. Negative 7. Neutral 8. Don't know
61. And the economic effects of flood insurance--property value, damage costs, compensation or others. Are your feelings mostly positive or mostly negative?
1. Positive 2. Negative 7. Neutral 8. Don't know
62. What about the social and emotional effects on you of outright purchase of flood plain property to reduce flood damage? Are they mostly positive or mostly negative?
1. Positive 2. Negative 7. Neutral 8. Don't know
63. And your feelings about the economic effects of outright purchase. Positive? Negative?
1. Positive 2. Negative 7. Neutral 8. Don't know
64. You remember we talked about ways of transferring some aspects of property rights, such as development rights or conservation easements, without having the owner actually sell his property. From your own point of view, would the social and emotional effects on you be mostly positive or mostly negative?
1. Positive 2. Negative 7. Neutral 8. Don't know
65. What about the economic effects?
1. Positive 2. Negative 7. Neutral 8. Don't know
66. What about the social and emotional effects on you of flood warning and evacuation programs?
1. Positive 2. Negative 7. Neutral 8. Don't know
67. And the economic effects?
1. Positive 2. Negative 7. Neutral 8. Don't know
68. How about your feelings about the social and emotional effects of disaster relief programs on you? If you recall, this included such things as temporary shelter and low interest loans to help
-

* * * (ASK OF FLOOD PLAIN SAMPLE ONLY)

businesses and residents recover from serious flood damage.

1. Positive 2. Negative 7. Neutral 8. Don't know

69. What are your thoughts on the economic effects for you of disaster relief programs? Positive? Negative?

1. Positive 2. Negative 7. Neutral 8. Don't know

70. We have talked about a lot of different ways to reduce flood damage. All of these ways potentially affect people's property rights in one way or another. On the whole, if you had to decide, which of these five approaches would you choose for the Northampton area?

1. Keep things as they are and not provide any additional protection measures or controls except for providing flood warnings, evacuation assistance, and disaster relief.
2. Build more dams and dikes even though it may mean requiring owners in communities other than Northampton to sell their property or affect them in other ways.
3. Use measures such as flood plain zoning and flood insurance or transfer of development rights which restrict the owners' use of property on the flood plain but do not require them to sell and move away.
4. Provide programs which offer financial incentives or assistance to flood plain landowners to voluntarily flood proof buildings, maintain open space areas, or give up some rights to develop their land.
5. Purchase property in the Northampton area which is on the flood plain, even if owners must be required to sell and relocate their residents or businesses (with government assistance, of course).
8. Don't know.

71. How many people live here with you? ENTER NUMBER ____/____.

(INCLUDE THE RESPONDENT. BE SURE YOU UNDERSTAND WHAT THIS ANSWER REALLY MEANS.)

72. Do you own any land or buildings on a river's flood plain?

1. Yes (GO TO Q. 73) 2. No (SKIP TO Q. 75)
8. Don't know (SKIP TO Q. 75)

73. Do you own a: YES NO POSSIBLY
- | | | | |
|------------------|----|----|----|
| House | 1. | 2. | 8. |
| Business | 1. | 2. | 8. |
| Farm Building(s) | 1. | 2. | 8. |
| Land | 1. | 2. | 8. |
| Other | 1. | 2. | 8. |
- Specify _____

74. Do you have flood insurance for this property? (PROBE: Does your insurance cover flood damage?)

1. Yes 2. No 8. Don't know

75. Since you came of voting age, how frequently have you voted in NATIONAL elections--every election, most elections, some elections, or hardly any elections? CODE BELOW Q. 76.

76. And how about LOCAL elections?

	Every Election	Most Elections	Some Elections	None or Hardly Any	Not eli- gible to Vote	Don't Know
NATIONAL	1.	2.	3.	4.	7.	8.
LOCAL	1.	2.	3.	4.	7.	8.

77. In addition to voting, some people express their concerns for how the community should be run by actively participating in civic clubs (such as Rotary or League of Women Voters), special interest groups (such as labor unions, PTA or Audubon) or other public spirited organizations. Do you try to influence the way things are done around here by participating in such organizations by being a member, officer or giving financial support--very often, sometimes, occasionally or hardly ever?

1. Very often 2. Sometimes 3. Occasionally
4. Never or hardly ever 8. Don't understand or N.A.

78. Have you been aware of a public meeting held to discuss some issue important to this area during the past year or so?

1. Yes (Specify) _____
2. No (SKIP TO Q. 80) 8. Don't understand (SKIP TO Q. 80)

79. How frequently have you attended this type of meeting once you learned about it--almost always, often, occasionally, or rarely?

1. Almost always 2. Often 3. Occasionally
4. Hardly ever or never 8. Don't remember or never heard about one

80. What is the highest grade or year of school you have completed?

None	01 02 03 04 05 06 07 08	97
Elementary		
High School		09 10 11 12
College		13 14 15 16
Some graduate school		17
Graduate or professional degree		18

81. What kind of work do you do to earn a living?

ENTER RESPONDENT'S DESCRIPTION _____

CODE ONE OF THE FOLLOWING:

1. Professional or technical (e.g., Teacher, Nurse)
2. Managers, officials, or proprietors
3. Clerical or secretarial
4. Sales worker
5. Craftsperson or foreman
6. Operatives (e.g., driver, assembler)
7. Laborer
8. Private household worker (e.g., babysitter, caretaker, maid)
9. Other service worker (e.g., hairdresser, food service)
10. Farmers and farm managers
11. Farm laborers or foremen
12. Armed forces (active)
13. Homemaker (full time)
14. Student (full time)
15. Retired (full time)
16. Unemployed
97. Don't know or no response

82. In what year were you born? ENTER YEAR 1 / 9 / /

83. How many years, altogether, have you lived around Northampton?

ENTER NUMBER OF YEARS /

PROBE. All I need is your best guess.

84. And how many years have you lived in this house? (or had your business at this location?)

ENTER NUMBER OF YEARS /

* * * (ASK FLOOD PLAIN RESIDENTS ONLY)

85. Do you own this building?
1. Yes 2. No 8. Don't know
86. Does this building get water from the Town water supply?
1. Yes 2. No 8. Don't know
87. How about sewage, is it on the Town's sewer line?
1. Yes 2. No 8. Don't know
88. Has any flood proofing that you know of been done for this building?
1. Yes (Specify) 2. No 8. Don't know
Specify _____

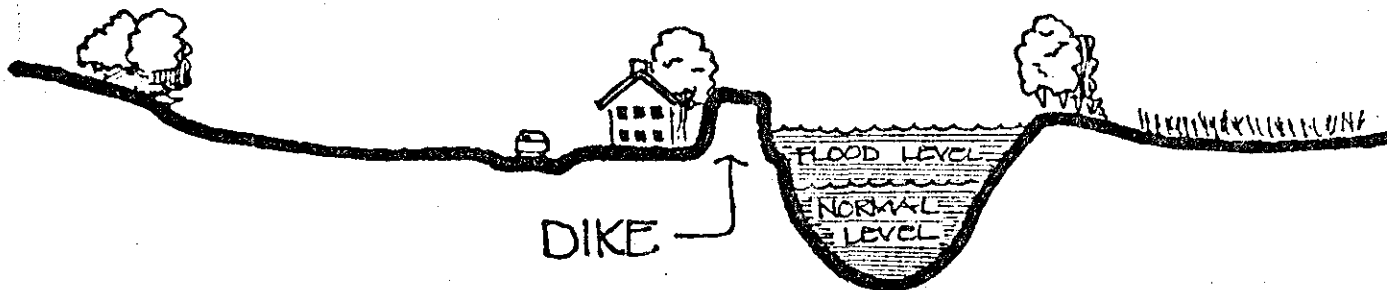
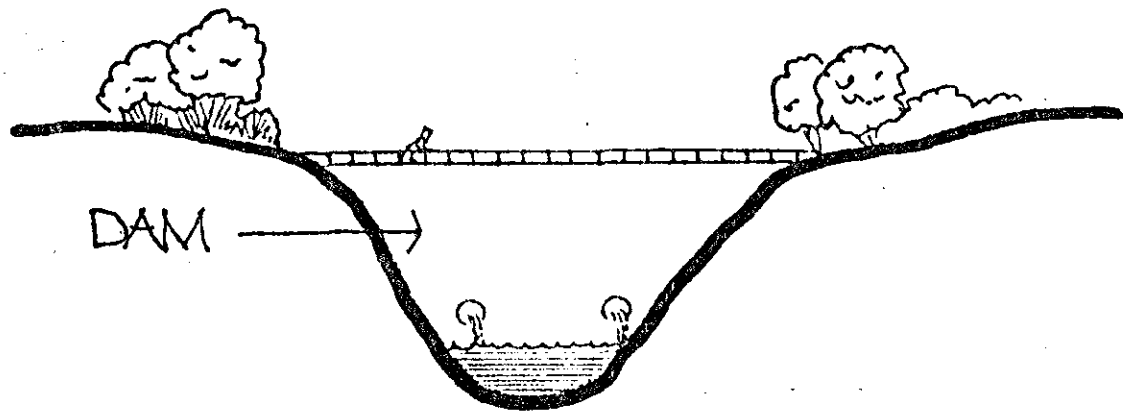
89. Have you spent any of your own money or done anything to protect your property from future flood damage?
1. Yes (Specify) 2. No 8. Don't know
Specify _____

90. Were you aware of possible flood problems when you first moved here?
1. Yes 2. No 8. Don't know 7. Not applicable

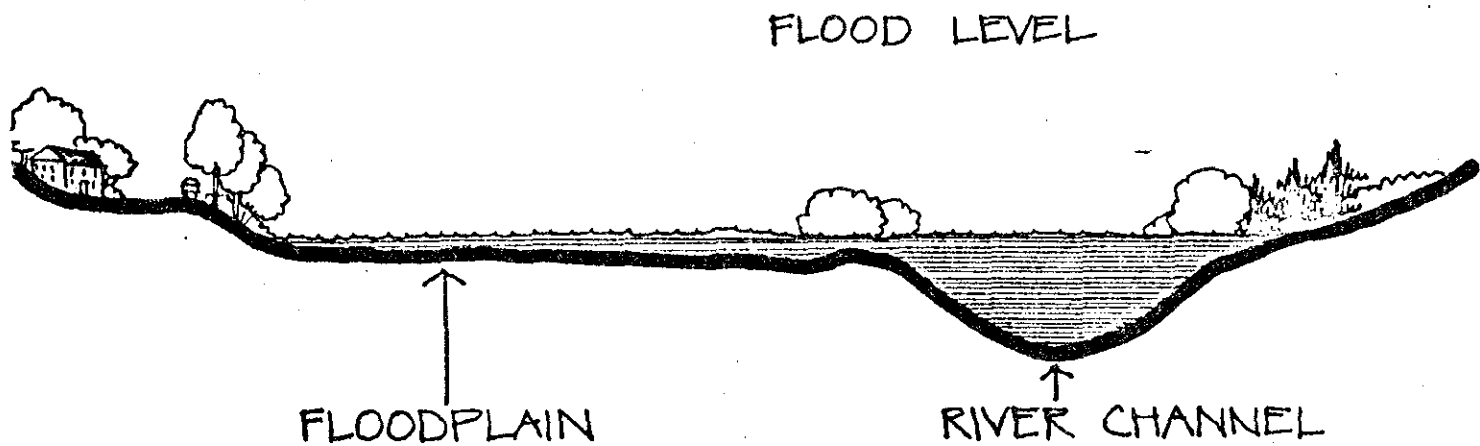
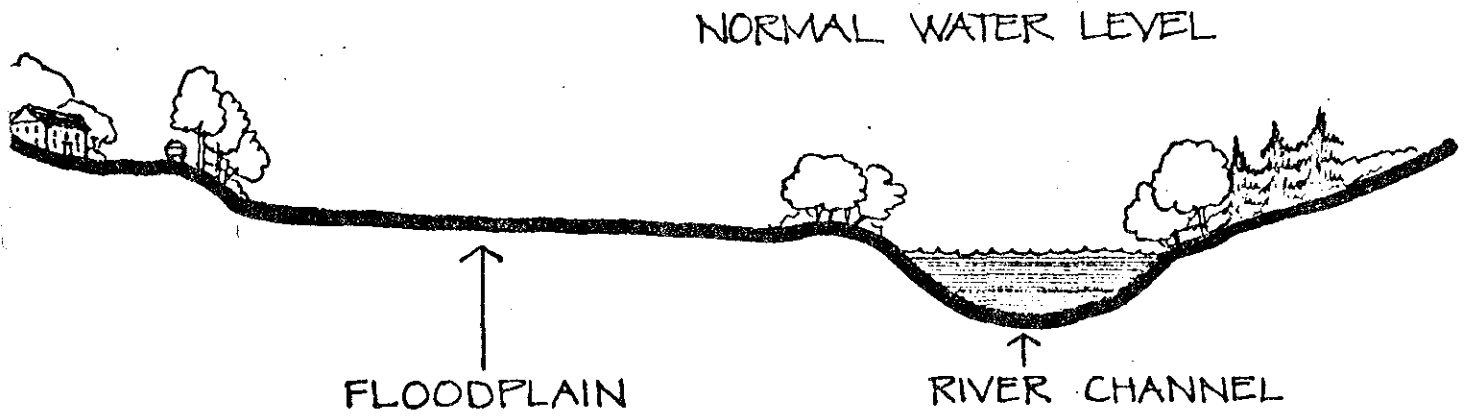
CODED BY INTERVIEWER

91. (FP ONLY): 1. Resident 2. Farmer
3. Businessperson. (ASK IF NECESSARY)
92. Respondent's Sex: 1. Male 2. Female (ASK IF NECESSARY)

TOTAL LENGTH OF INTERVIEW / MINUTES.



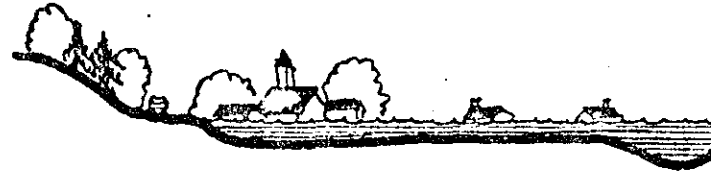
dam and dike



floodplain
river channel

NORMAL WATER LEVEL

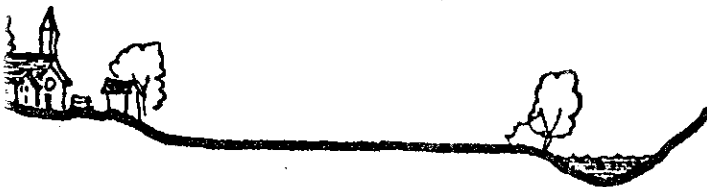
FLOOD LEVEL



WITHOUT FLOODPLAIN ZONING

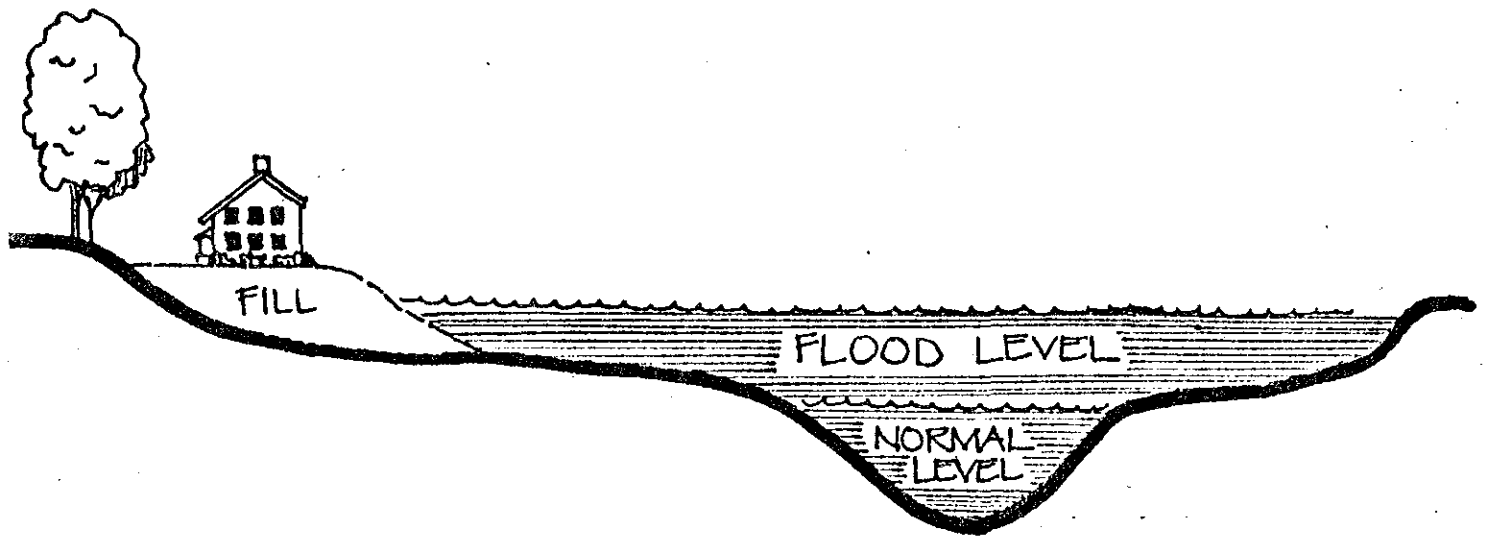
NORMAL WATER LEVEL

FLOOD LEVEL

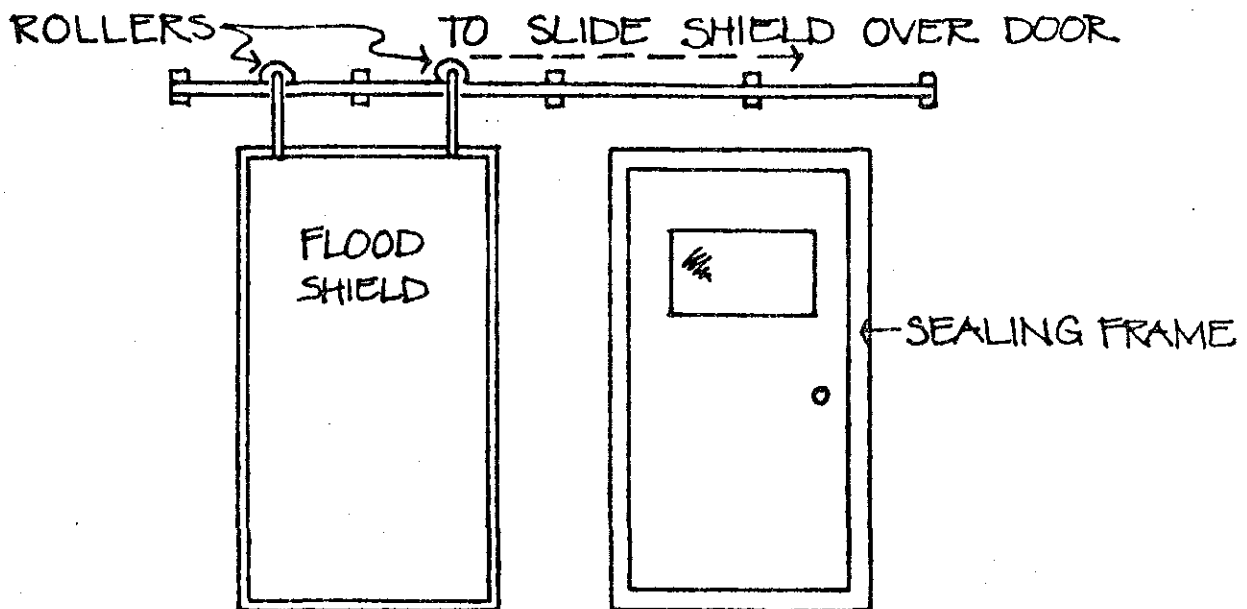


WITH FLOODPLAIN ZONING

floodplain zoning



MODIFICATION OF SITE: STRUCTURE ON FILLED LAND



MODIFICATION OF STRUCTURE: SLIDING FLOOD SHIELD FOR DOOR

flood proofing

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